

Business Evolving in the Information Age

darwin



LINUS TORVALDS, THE INVENTOR OF LINUX, watched his college hobby become first a movement and later a red-hot business opportunity.

PAGE 22

ARMED
WITH
INFORMATION

The Military Reboots

In the not-too-distant future, **networked information** will help soldiers fight battles smarter and more fiercely. Proving once again that **knowledge** is the most advanced weapon.

PAGE 48



November 2001

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PLUS LIFE IN A CORPORATE INCUBATOR
How Cargill hopes to produce a bumper crop of e-business startups PAGE 64

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ON THE COVER

THE MILITARY REBOOTS

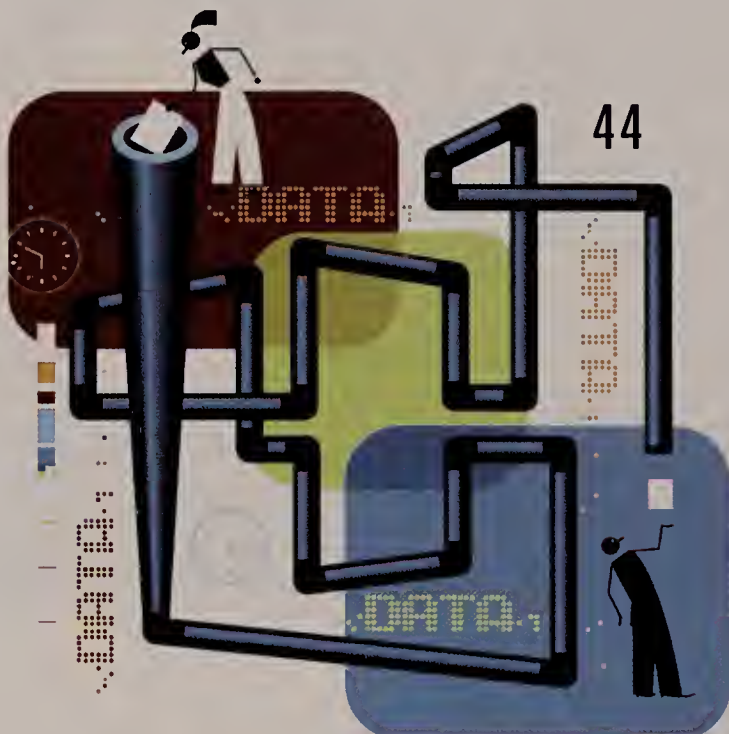
What will happen when every soldier in the field is armed with networked information?

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By Meg Mitchell Moore

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A Rubble of Information

At the moment, it's unimaginable how our minds will work in November, when you read these words. Because today (the now of my writing) it is still our awful September. I can only look ahead and predict that by then (the now of your reading), we will all have read way too many words—about the cranes gingerly lifting twisted beams or the five-gallon buckets full of granulated structure being passed along a line of exhausted workers. By then, a consensus will possibly have gathered around a discreet, circumspect silence. (Or else we will, as a nation, be noisily at war.) Still, it is the nearly helpless impulse of even those of us with discouragingly long “lead times” (the distance between writing and publishing something) to respond with some act of recognition.

Right now, as I write, it's not even a week. The loss is metered out in tonnage—only a small percentage of which has so far been removed; in grief heavier than the tonnage itself; in the waning hope that miracles will return to us any of the thousands missing; in the gathering, welling, vengeful anger and its weird companions—uncertainty and ambiguity—as we look forward to rubbing out the villains.

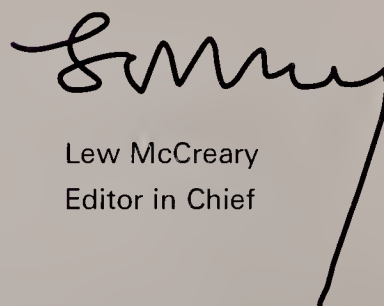
At the ground zero of my own personal reactions, I confess that I felt all the primal emotions the villains must have engineered into this act with as much forethought as

they calculated the effects of burning jet fuel on structural steel. I was immediately mortally afraid, amazed, spooked, nearly deranged. Like some kind of lab rat exposed to a nasty stimulus, I wanted to run around in circles and hide. One of our small conference rooms filled quickly with colleagues. We watched the television. Many could hardly stand it after only a few minutes, getting up and leaving only to return, to test their disbelief, before leaving again and returning again.

At home—once I got there—I locked the doors and windows, knowing even as I did it how nutty that was. As the week wore on, the weight of unrelieved sadness and incredulity sanded away everyone's equanimity. By the weekend, sagging spirits needed something like a Marx brothers festival, yet it was hard to seek amusements with any real enthusiasm.

Here in Boston, where two of the deadly flights originated, we felt a special level of chagrin. Local police and FBI quickly found spores of the terrorist plot, a reminder that law enforcement is best at solving crimes that have already occurred, but much less good at preventing them. The key to prevention is, of course, information. And information—mostly the knitting together and analysis of information—is clearly what failed us. Too many pieces that might have been useful as a fabric floated here and there, disconnected, a rubble of incomplete knowledge.

With respect to this issue of *Darwin*, we wrestled over whether to stick with our plan to feature Senior Editor Daintry Duffy's story (about the use of information networks in warfare—see “Information Is a Weapon,” Page 48) on our cover. Rather than yank it, we sought to soften the imagery of warfare presented. We hope that readers will appreciate that the story showcases yet another arena of human endeavor where the reengineered flow of information can produce dramatic changes and improved decision making. But as events have made so clear, information is powerful only when we collect and interpret it really well.


Lew McCreary
Editor in Chief

A small team of dogs, including a Border Collie, a Golden Retriever, and others, are pulling a sled across a snowy field. The sled is loaded with various items, including a small house, a car, and other household objects. The dogs are harnessed together and are pulling the sled with effort.

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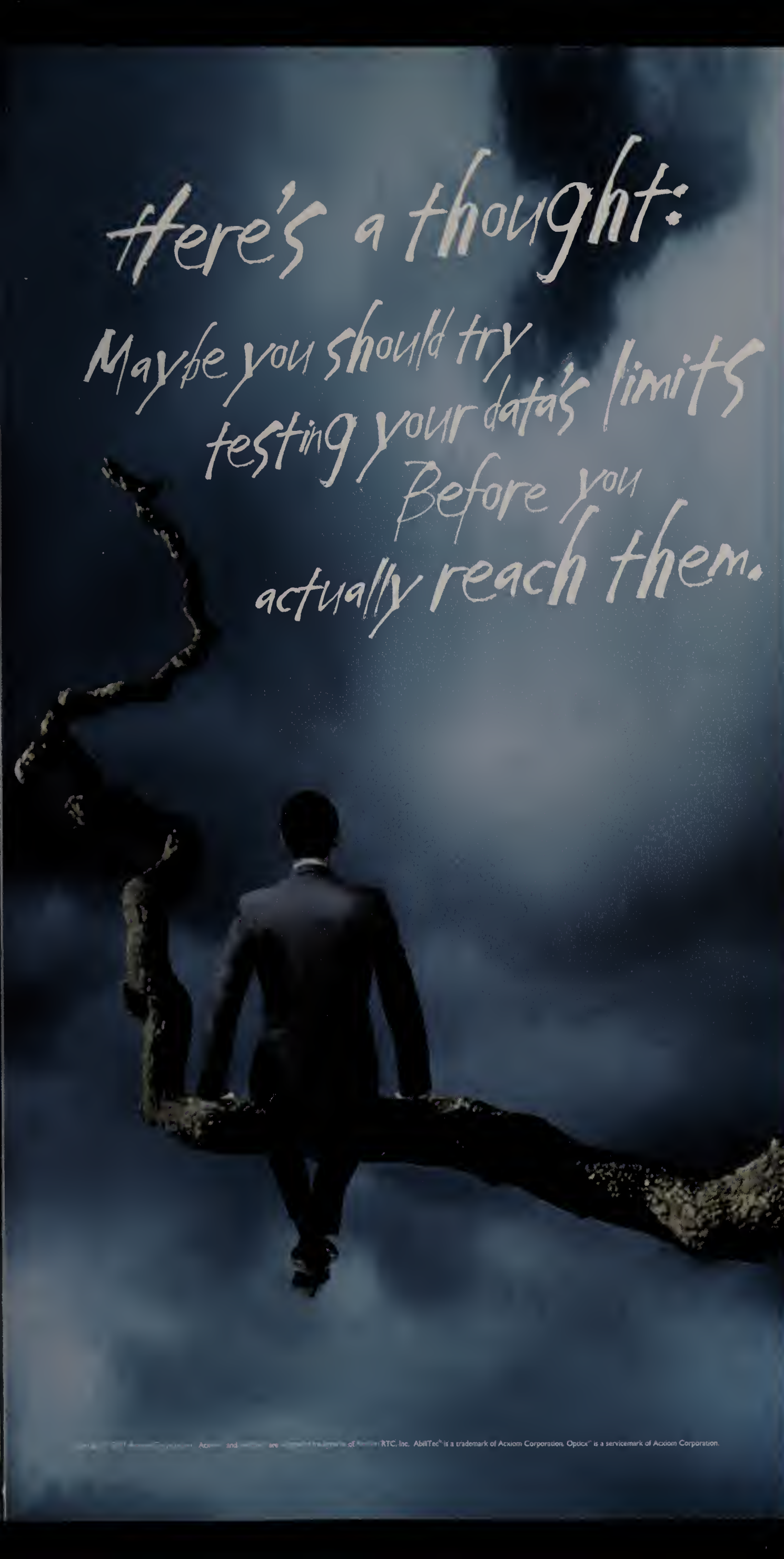
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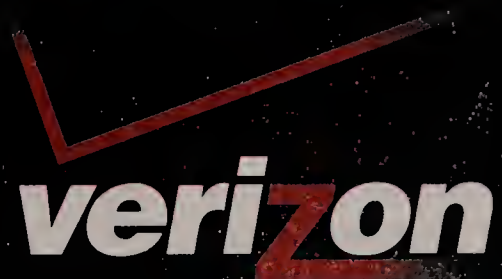
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buzz

NEWS, VIEWS AND THE HUM OF BUSINESS

Edited by Todd Datz



IT in the Boardroom

EXECUTIVE SURVEY Major corporations need to speed up information technology and e-business projects to keep up with quickly changing technologies, according to a recent report on the current state of IT strategy around the world. London-based Compass Management Consulting and the London Business School surveyed 200 CEOs from large companies in 14 countries. They found that 52 percent of the executives are heavily involved in e-business projects. In addition, respondents are developing e-business plans with time frames of more than one year, a trend that raises some concern among Compass executives.

"With e-business,

the technology is changing so rapidly that you really need to put projects on short time frames," says **Andy Chestnutt**, head of Consulting Services UK in Compass's London office. Chestnutt also says the survey showed that CEOs appear to be applying the same approach to e-business strategy as they do to traditional strategy—reviewing their game plans just once each year. "That should ring alarm bells," he says. "With e-business you need to continually monitor your strategy."

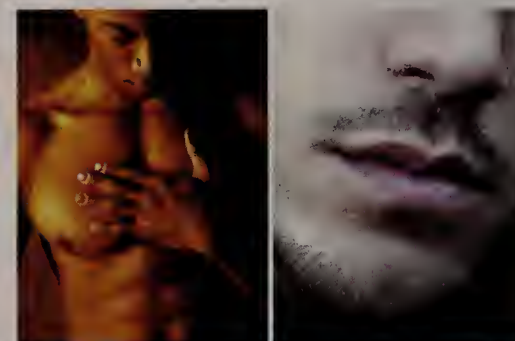
Despite the concerns, the annual survey—titled the "Compass World IT Strategy Census 2001"—showed that IT, and e-business in particular, is increasingly becoming a priority in the boardroom. Compass asks different questions each year, so it's hard to compare this year's survey with previous ones. However, it appears that CEOs are realizing to a greater extent that e-business is a core piece of their business strategy. "Business managers and CEOs are realizing that it's e-business and not e-technology," Chestnutt says. "Traditionally, what CEOs have done is to say, 'It's e-commerce, I better give it

to my CIO.' This year, that has changed."

The survey also reports that 61 percent of executives have their e-business and IT strategies aligned and that 67 percent of those

surveyed have a formal e-business strategy. E-business, however, has yet to bring significant benefits to most companies' bottom lines, according to the survey. "Making sure there's a financial return on investment is increasingly important," Chestnutt says. "That's the major challenge that lies ahead."

—Susannah Patton



The Darwin Meter

EVOLVING	DEVOLVING
Dell, Sun and IBM	HP-Compaq
Tech industry mergers	Value for shareholders
Burning CDs	Cassette-loving baby boomers who understand what that means
Station wagons' "cool" factor	Station wagons' "tragically unhip" factor
2GHz PC chips	The need for 2GHz PC chips
Harry Potter the movie	Any movie opening against it
Men shaving chest hair	Men shaving facial hair
People repeating tired game show lines ("Good-bye!")	Chance of that British import surviving much longer ("Good-bye!")

The Spreadsheet

- 67%** Companies with a formal e-business strategy
- 52%** Executives with a significant personal involvement in e-business strategy
- 21%** Companies with e-business plans that have time frames of less than a year

A New Era

of Information Availability Management

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Keeping the World's Business-Critical Information Available

Your marketing department needs a specific file to prepare for an important sales presentation, but the information was deleted 30 days ago. Can your IT organization save the day or is the information lost forever?

A 6.5 earthquake has made a shambles of your data center. No lives were lost, but servers are down and mission-critical information is unavailable. How fast will you be able to bring operations back to their normal footing, and can you guarantee recovery of all your critical information?

A series of mergers and acquisitions have left you with storage resources scattered across a crazy quilt of platforms, networks and geographically dispersed sites. How do you manage all these heterogeneous media, devices and systems to make your business work as a single, efficient unit?



Networks of Information

Today's enterprise information infrastructure resembles a network of nerves and synapses that stretch around the globe. Business-critical information travels these networks at the speed of light without regard to geography or time zones. It flows across myriad platforms, operating systems, networks, clients and servers. It is stored in widely dispersed

nodes on a network and is expected to be instantly accessible to any authorized person no matter where they are located or when the request is made.

This is a tall order, but business is rising to the challenge. A key indicator of the rapid adoption of the advanced information storage and retrieval systems that make this scenario possible is the growth of the storage area net-

darwin

Custom Publishing

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working (SAN) market. Dataquest predicts that the overall storage market for multi-user servers will grow from \$31.7 billion in 1999 to \$72.3 billion in 2003, an aggregate CAGR of 24.7 percent. According to market researcher allSAN.com, storage networking has emerged as one of the highest growth areas of storage. SAN revenues are expected to grow from \$508 million in 1999 to \$3.5 billion in 2003, a 90.3 percent CAGR. By next year, says all SAN.com, enterprises will consume 1.4 million terabytes of storage annually; 12 times the amount used in 1998.

"This proliferation of distributed systems and the exponential growth of business-critical information means that enterprises must develop a comprehensive strategy to manage and protect their data," said David B. Wright, Chairman and CEO of Legato Systems Inc., headquartered in Mountain View, CA.

Wright said that a strategy that provides the required levels of information protection, application availability and management, will be made up of several key elements. Included are:

- Strategies and technology to ensure data and application availability
- Deployment of systems with the performance and scalability required to handle increasing volumes of data and new technologies added to the enterprise infrastructure
- Reducing the cost of storage operations
- Ensuring reliable, highly responsive backup/restore operations
- Interoperability, including the ability to handle Linux, NetWare, Windows and UNIX operating systems
- The ability to resume business services despite catastrophic site or systems failure
- Creation of a storage management infrastructure to support the introduction of a new storage-dependent product or service

"More than ever, today's enterprises need a seamless, automated business environment," Wright said. "In terms of information protection, IT organizations must implement online and transparent systems that backup open files and live databases without downtime or disruption. And, if there is a problem, such as inadvertently deleted files, a corrupted database or a major outage, administrators must be able to quickly restore mission-critical data and help bring business operations back to normal.

"To ensure optimum data and file availability, you need data duplication and distribution to both local and remote sites," he continued. "You also want to make sure that your users will have 24X7 access to information and network services such as Internet access, and printing and file services. Also, to bring about high levels of information protection and availability, you need centralized capabilities to configure, control and man-

age your storage resources across heterogeneous platforms, networks and operating systems.

"This is why Legato developed our Information Availability Management offering suite—a consolidated family of automated storage management products that provide protection, availability and management of today's highly distributed business information," Wright said. "Included in this solution suite are leading-edge consulting and customer support offerings. It is absolutely critical to provide comprehensive services that address the full spectrum of enterprise IT challenges our customers are faced with."

Meeting the Information Protection Challenge

Legato's NetWorker is on the job at SAP AG headquarters in Walldorf, Germany and the SAP site in Philadelphia, PA. The backup operations are notable not only for the amount of data involved—at Walldorf alone, the Legato platform is responsible for the daily backup of 12 terabytes of data on more than 1000 servers—but for the range of databases and operating systems involved. With SAP's products being executable on a variety of platforms, NetWorker is providing backup support for AIX, Linux, Windows NT and Unix and operating systems, as well as a variety of databases including IBM's DB2, Informix, MS SQL Server, Oracle and the SAP database SAPDB online.

Legato NetWorker is the flagship of Legato's suite of information protection solutions. Legato Celestra

extends NetWorker's functionality by freeing the enterprise from the impact of backup and restore operations through live, serverless, LAN-free backup.

For disk-to-disk replication between data centers located across geographically dispersed areas, Legato's solutions incorporate popular third-party replication tools such as EMC Symmetrix Replication Data Facility and its own Legato Octopus for Windows.

ABN AMRO, a large insurance company headquartered in Zwolle, the Netherlands, is an example of how rapid growth in both a company's business and mission-critical data lead to the deployment of information availability solutions.

Legato was chosen to provide backup to the company's most demanding applications even before ABN AMRO migrated from its older OS/2 LAN Server environment to an infrastructure based on Windows NT. The new infrastructure is handling massive and constantly growing amounts of data. Legato's NetWorker data backup and archive is incorporated into the company's IT environment which includes a farm of 60 servers.

Paul P.J.M. Jannink, head of Infrastructure Management for the company's Insurance Directorate, said that, "Although (cur-



David B. Wright
Chairman & CEO
Legato Systems Inc.

rent insurance files) represent 100 Gigabytes or a pile of paper 780 meters high, the quantity of information will probably increase fivefold in the next three years." The Legato platform has its work cut out for it.

Ensuring Data Availability

The Santa Fe International Corporation is a world leader in contract drilling. Operating both marine and land based drilling rigs, Santa Fe has more than 20 permanent offices around the globe and numerous temporary offices at their job sites.

Because e-mail is the glue that binds together the companies far-flung operations, Santa Fe decided to install a high availability solutions to ensure access to e-mail, accounting software and other server functions 24X7.

Santa Fe chose the Legato Co-Standby Server in order to achieve as close to 100 percent uptime as possible. Co-Standby Server for Windows NT assures availability of critical applications and resources such as e-mail, databases and files, network services, IP addresses and printers.

For high availability and automated management of enterprise applications such as ERP, database, e-mail and Web applications, Legato also provides Automated Availability Manager. This product supports a full range of heterogeneous platforms including Solaris SPARC, Solaris Intel, HJP-UX, AIX, Linux and Windows NT 2000.

Other Legato high availability products include its Standby Server, Microsoft Cluster Service (MSCS) Mirroring, Legato Octopus and OFF Site Archive for disaster recovery.

Managing Data Storage Resources

Siemens ElectroCom, Arlington, TX, is one of the world's largest postal automation and distribution technology firms. It uses a Legato SAN solution to back up an 80-gigabyte SAP database and its entire server farm. Siemens ElectroCom also deployed Legato's GEMS SmartMedia platform in order to consolidate its storage by dynamically allocating tape drives across Oracle, Microsoft Exchange and SAP servers.

Legato GEMS (Global Enterprise Management of Storage) is the first open management software that allows enterprise to provide global management consistency and control of distributed storage and data protection across the entire enterprise. From a central console, administrators can monitor, manage

and administer applications resources across platforms, networks and geographically dispersed sites. GEMS simplifies the complex business of managing the protection and availability of critical enterprise information.

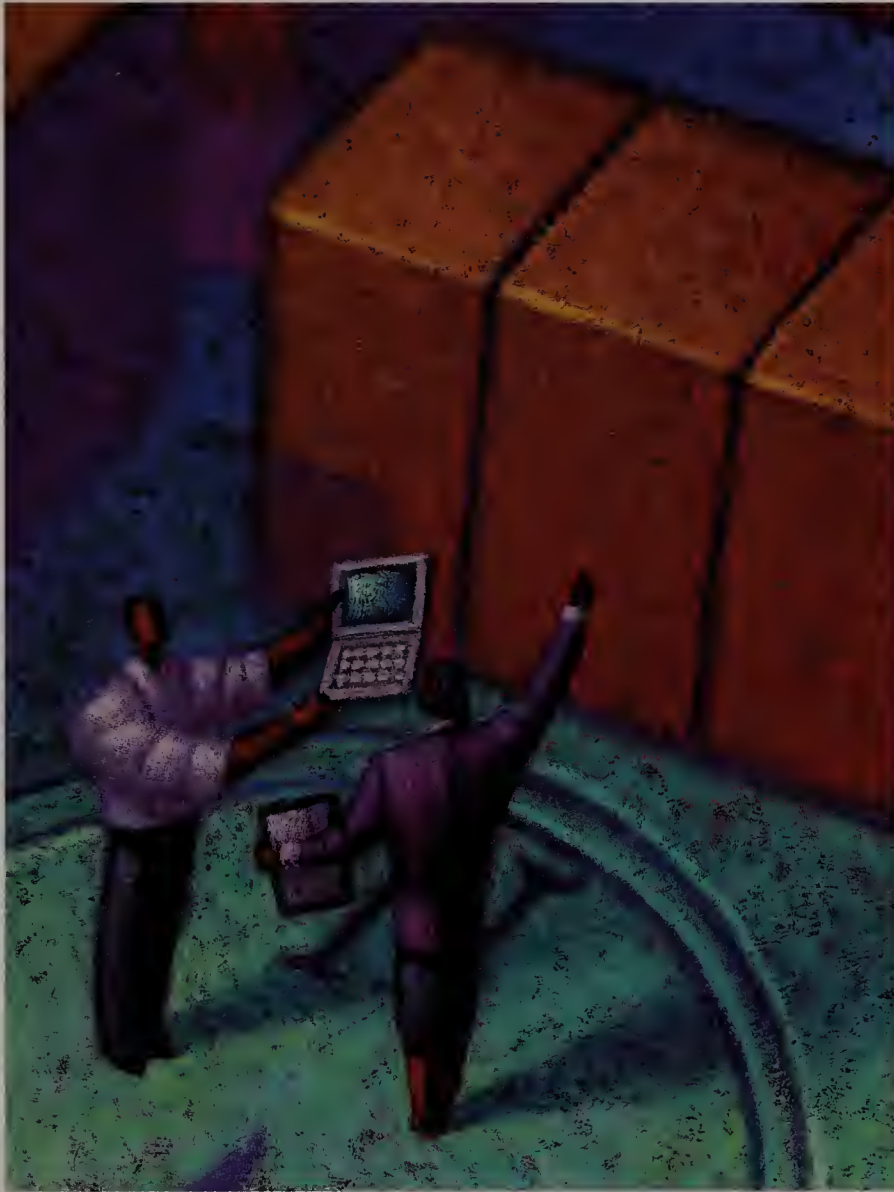
Strategic Alliances

In addition to its own global operations in 23 countries, Legato has formed extensive strategic partnerships and alliances to provide business information availability solutions. Among its strategic alliance partners are, Compaq, EMC, Hewlett-Packard, IBM, Microsoft, NetworkAppliance, Oracle, Sun Microsystems and many other leaders in storage and technology. In addition, the company's products are available through a global network of authorized channel partners servicing clients across North America and Europe, Africa, Eastern Europe, the Middle East, Asia, Southeast Asia and the Pacific Rim.

A Critical Need

"No one needs to be reminded that we live in a complex and technologically challenging world," Wright said. "In today's global business environment, the need to protect the synapses of businesses, ensuring that critical knowledge and data goes where it's needed, when it's needed, without interruption or delay, has become a strategic imperative.

At Legato, we're proud to serve more than 10,000 customers worldwide. We will continue to develop and provide the technologies that allow these customers to benefit from the continuance of business operations no matter what the situation. Our goal is to help them meet today's and tomorrow's enterprise IT challenges as e-business and storage demands continue to develop and expand on a global scale." ■



For more information, log on to www.legato.com or call 650-210-7000

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Strategies for the New Reality

The events of 2001 have proven that America's business and IT organizations are both adaptive and strong — but where do we go from here? In times of such great uncertainty, CIOs need to come together to re-assess business and technology priorities, forecast critical IT investments, and strengthen the overall organization.

Conference highlights include:

The Economy — A Special Report
How long is the road to recovery?

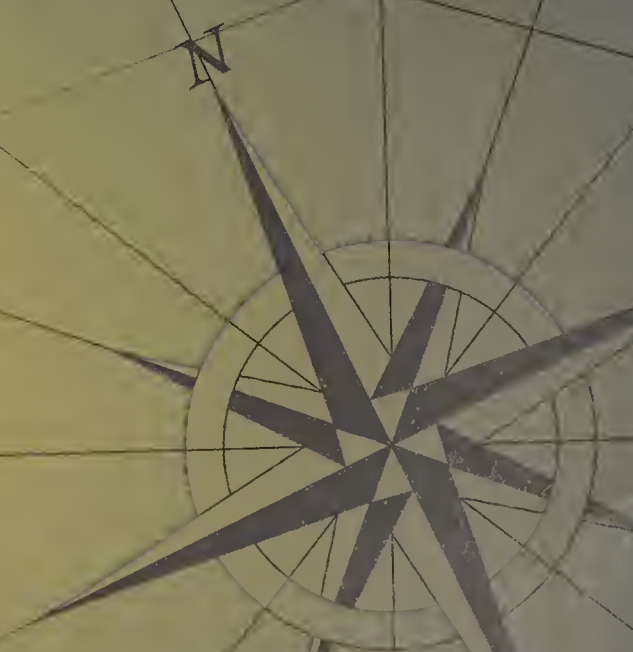
IT in the Global Arena
What can we learn from far-flung IT operations?

New Government Legislation
How will the many new laws impact your business?

Alignment is Still Important
How can IT and business stay in sync?

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Linus Torvalds

Godfather of the open source movement

When he created Linux—the computer operating system that bears his name—Linus Torvalds didn't consider it a revolutionary act. "I was just hoping to have something usable in my own bedroom," he recalls, noting that back then he was a confirmed computer geek with his computer positioned faithfully on a desk beside his bed.

It was 1991, and Torvalds was studying computer science at the University of Helsinki in his native Finland. He was frustrated because he wanted his home computer to run on the same OS found on the university's computers. But as a student he couldn't afford to buy it. So Torvalds decided to create his own OS, which he dubbed Linux (LIH-nucks). His idea—which was and still is a radical one—is that all users have the right to a free, professional strength operating system that they can tweak and bend for their own purpose.

Once Torvalds had created his first version, he put it out on the Internet, never suspecting that the response would be so overwhelming.

Linux quickly caught on with programmers around the world, and thus was born the open source movement, which trumpets the notion that users should have access to the source code that governs the infrastructure of their computers. "With Linux, or any

number of other open source projects, anybody has the right to say, 'On my computer, I will do it my way,'" says Torvalds. Of course, only a small percentage of computer users dare to wade through source code; but for the first time Linux gave people that choice.

Ten years later, Torvalds is amazed to find himself still working on his college hobby. In fact, support for the open source movement has grown to the point that it is considered the underdog challenger to the supremacy of Microsoft and its closeted approach to OS development. "From a journalistic perspective, it's been about Linux versus Microsoft, but to me it wasn't a war," he says. "It was and still is about just having good technology on my machine."

Although many companies, including heavyweights 3Com and IBM, have incorporated Linux into some of their offerings, Torvalds has never really been interested in the business side of his invention. "The more I see of it, the more I get the feeling that I'd have multiple ulcers within minutes of getting involved in the business side," he says. "It's kind of like watching giraffes making love on the Discovery Channel. You definitely don't want to get involved, but it's kind of fascinating to follow."

Recently, Torvalds spun his experience with Linux into a book (coauthored with David Diamond) titled *Just for Fun: The Story of an Accidental Revolutionary* (Harper Business, 2001). Writing the book gave him a chance to take a break and devote himself to something other than Linux. "It's good to do something different every once in a while," he says. But despite the need for an occasional respite, Torvalds is still fascinated by all that computers can accomplish. "You can build your own small virtual world inside of them," he marvels. "The challenge there is what I find interesting—not the technology itself."

—Daintry Duffy

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Battling PC Demons

SAFETY FIRST Computer Security Expert **Bruce Schneier** doesn't believe in perfect security, but he does think that people can keep themselves safe in the electronic world. The following are some of Schneier's top tips.

1 Passwords Create long, random passwords, and write them down.

Store them in your wallet or in a program such as Counterpane's PasswordSafe (www.counterpane.com).

2 Antivirus software Download and install the updates every two weeks and whenever you read about a new virus.

3 Personal firewall software Use it. There's no reason to allow incoming connections from just anybody.

4 E-mail Delete spam without reading it. Immediately delete messages with file attachments unless you know what they contain.

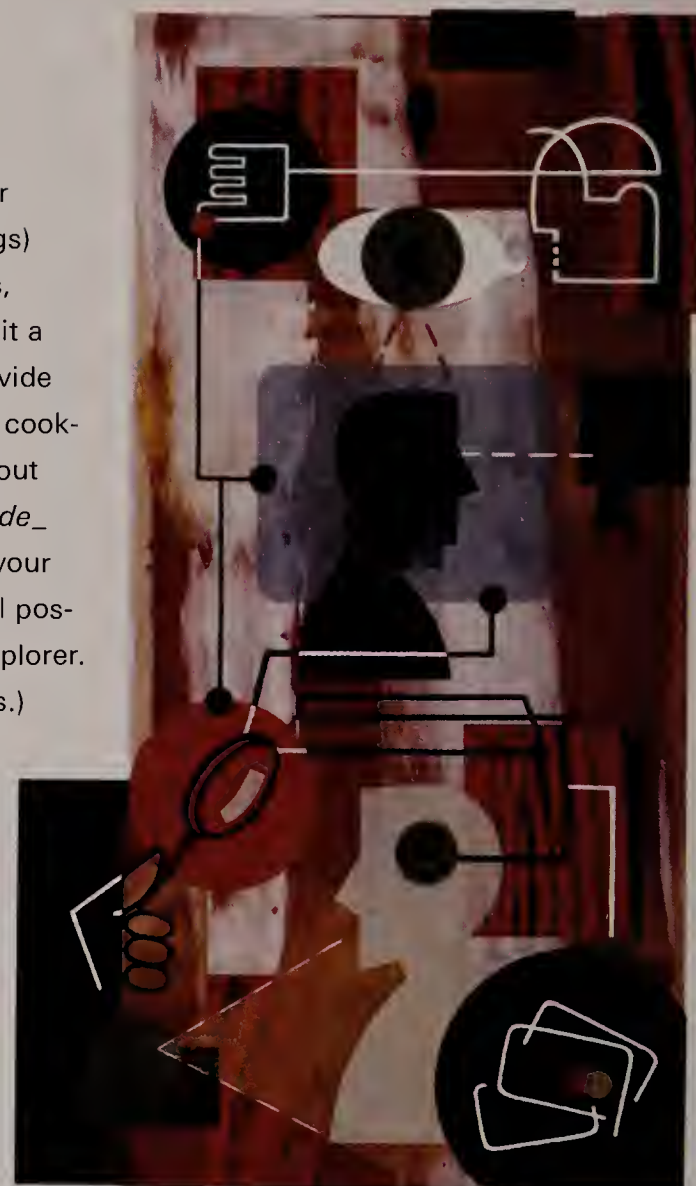
5 Websites Limit the personal and financial data you send to websites. Don't give out information unless you'll get something worthwhile in return.

6 Browsing Limit use of cookies (bits of code webpages can store on your

computer to save things such as your name, password and personal settings) and applets (small programs—games, video players—that run when you visit a webpage) to those few sites that provide services you need. (For more info on cookies and how to remove them, check out www.cert.org/tech_tips/malicious_code_faq.html#steps.) Regularly clean out your cookie and temporary folders. If at all possible, don't use Microsoft Internet Explorer. (It has been a prime target of hackers.)

7 Backups Back up your files regularly to disk or tape (Zip disk, floppy disk, CD-RW—whatever works for you). Store at least one backup offsite in case of fire or other catastrophe, and keep one copy on hand locally for quick recovery. Destroy your old backups to keep them from falling into the wrong hands.

8 Laptop security Keep your laptop with you at all times; think of it as a wallet or purse. Regularly purge unneeded data files from your laptop. (Don't need that sales lead data anymore? Delete it.) The same goes for



handheld computers.

9 Encryption Install an e-mail and file encryptor, such as those from PGP Security in Santa Clara, Calif., which turns your data into unreadable characters unless you enter the proper password. (For more info on PGP check out www.pgp.com/products/desktop-privacy.asp.) Encrypt important e-mail and data files, such as tax returns and bank account numbers.

10 Shut down Turn off your computer when you're not using it, especially if you have an "always on" Internet connection such as DSL or a cable modem.

—Bruce Schneier is the chief technology officer at Counterpane Internet Security and the author of several security books, including *Secrets and Lies: Digital Security in a Networked World* (John Wiley & Sons, 2000).

ILLUSTRATIONS TOP BY CELIA JOHNSON; BOTTOM BY LOU BEACH



King (or Not King) for a Day

A recent survey asked 500 business professionals to name the company they would most and least like to lead as CEO.

Which company would you **MOST like to run today?**

1. Wal-Mart
2. Microsoft
3. Coca-Cola
4. AOL Time Warner
5. ExxonMobil

Which company would you **LEAST like to run today?**

1. ExxonMobil
2. Philip Morris
3. Microsoft
4. AOL Time Warner
5. Cisco Systems

SOURCE: A JUNE 2001 SURVEY BY BROUILLARD COMMUNICATIONS

DATA STORAGE IS NO LONGER *THE SILENT PARTNER.*

IT'S THE ONE SCREAMING FOR YOUR ATTENTION.



fig. 1.1: Storage screaming for your attention (metaphor)

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Machine Politics

CHAD'S LEGACY Thanks to last year's election debacle, more than two dozen vendors are hawking high-tech voting systems that they say won't leave behind any dimpled ballots, hanging chads or doubts about which candidate received the most votes.

Most are developing computerized devices that they claim are more accurate than the punch card, mechanical lever, paper ballot and optical scan systems that are now used at the nation's 192,000 voting sites.

In June, Dell Computer announced it will manufacture a device called eSlate for Hart Intercivic, an Austin, Texas-based voting services company. Unlike most of the new devices, eSlate is not a touch screen. It looks like an oversize Palm device with a wheel that voters use to select a candidate. "ESlate doesn't have the problems that touch screens have, like misvotes as a result of a slipped hand," says **Bill Stotesbery**, Hart Intercivic's vice president of marketing. "And it's less expensive, around \$2,500—half the price of touch screens."

According to a recent study by the California Institute of Technology and MIT, 4 million to 6 million votes were lost in the 2000 presidential election, owing in part to the thousands of error-prone punch cards and mechanical lever machines. (The study recommended that municipalities without an optical scan system either adopt one or adopt a newer electronic system.) The Federal Election Commission pegs the total price to upgrade the nation's voting systems at \$2 billion to \$4 billion.

Congress is considering bills to help municipalities foot the steep price tag. A major obstacle, however, is that they are currently not obliged to replace their systems or use a standardized solution. That could leave the doors to future disputed elections wide open.

—Emelie Rutherford

buzz

Bridging the Accessibility Divide

A TECHNOLOGY ASSIST What happens when your printer needs a new cartridge or has a paper jam? Blinking lights and text alerts tell you. But that's not much help to sight-impaired people like **Joy Relton**, an assistive technology specialist at Unisys, who can't see any error messages.

Last year, Relton appeared before a congressional subcommittee representing the Information Technology Association of America (ITAA) and The Accessibility Forum, a government-sponsored partnership that helps assess how accessible IT products are to the disabled. She demonstrated assistive technologies, including braille note-takers (computers with braille keyboards and synthesized speech output), screen-reading programs (computers that read aloud what appears on the screen) and printers that speak up to explain their troubles.

"A lot of congressional representatives were interested in how these technologies worked, how those tools would help a disabled person and how their offices would accommodate someone with a disability," she says.

Relton has also served on a number of ITAA committees that have worked to strengthen Section 508 of the Rehabilitation Act of 1973. That law prohibited discrimination in any federally funded program on the basis of handicap. On June 21, a beefed-up Section 508 went into effect, requiring all federal agencies to develop and buy technologies accessible to disabled employees and to make their websites disabled-accessible.

"The enactment of 508 means several things. Webmasters now have standards to follow so that we can say, 'Your page isn't accessible for the following reasons,'" says Relton. "It also means that potential employees can be judged fully on their qualifications without having to consider how to deal with any disability they might have."

For more information, go to www.section508.gov.

—Stewart Deck



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If this reminds you of the relationship between your e-business and manufacturing systems,

The marriage between a company's e-business and manufacturing systems isn't exactly made in heaven. In fact, with one system chosen by the CIO and the other by the plant manager, for different aims and priorities, it's more like a shotgun wedding.

No wonder, then, that one system communicates up a storm on the Internet, while the other's hunkered down building inventory.

Or that one has a voracious appetite, while the other's working to get lean. Or that on those rare occasions when they even try to talk to each other, it's in different languages.

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Culture of Collaboration

The biggest challenge of getting employees to work together online isn't a technological one—it's cultural and organizational too



COLLABORATION, SUDDENLY, IS COOL.

The promise is enticing: Get employees working together online to solve problems faster and become more responsive to customer needs. Perhaps save on travel and communications costs in the process.

"Collaboration has definitely become one of the big buzzwords for 2001," says Bard Salmon, president of Cambridge, Mass.-based RealityWave, a company that makes software to facilitate the sharing of large engineering drawings and images of other 3-D objects over the Net. "C-level executives seem to just want to check the box off and say, 'Yeah, we're collaborating.'"

Almost any tool that supports information sharing inside and outside a company's walls has the potential to deliver value. Collaborative tools on the market today make it easy to coordinate large groups by enabling members to post questions, work jointly on documents, schedule meetings and track progress toward goals. But not every company is positioned to take advantage of the tools. The danger for many is overspending on collaborative technologies without

making the cultural and organizational adjustments necessary to derive any benefit from them.

"There's too much emphasis on what the tools can do and not enough emphasis on the people who use the tools," says Will Calmas, a psychologist who founded the consultancy Calmas Associates in Boston. "Collaboration software just won't work if you don't have a corporation that encourages people to work together."

That's a long leap for many companies where individuals are rewarded for controlling knowledge and highlighting their own achievements, not for sharing knowledge and focusing on team accomplishments.

It's impossible to prescribe a specific series of adjustments that will transform a company's culture from individually oriented to collaborative. That's as much of a challenge as giving Van Gogh, Matisse and Rembrandt instructions on how to paint a house together and arrive at a unified aesthetic. The following are 10 recommendations for getting employees to adopt collaborative tools and use them in an effective way.

1. Start small. Collaborative technologies shouldn't be dropped on employees like an anvil from above. "At a big company like Ford, you run the risk of being the flavor of the day if you introduce it all at once," says Kelly Vela, a program leader at Ford's Leadership for the New Economy program, which uses a collaborative tool called eRoom to train managers. Employees go through the program in groups of about 30, and once they are comfortable using eRoom, they bring it back to their "home" departments.

2. Find a champion. "You need a visionary—someone who sees what this tool can do for the company and is willing to stick his neck out and try it," says Salmon at RealityWave. The tool's champion will identify other willing users and build an initial team to test the technology in a real business situation. The champion can be an individual or a small select group. That's what happened at Shell International Exploration & Production, says Arjan van Unnik, a founding member of Shell's New Ways of Working group. The initial

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teams that used software from SiteScape, a Maynard, Mass.-based collaborative software vendor, were groups of several dozen people spread around the world who benefited from being able to work together freely over time and geography.

3. Pick a real problem. "You can't just start [using a collaborative tool] and see where it goes," says Jeffrey Beir, president and CEO of eRoom Technology, a Cambridge, Mass., software company. "You need grounding in an important business objective that needs to get done." Tackle a new product being developed or a big proposal being written, and get the team working on it to test the collaborative software.

Rather than **punish** employees who don't participate in the collaborative environment, **celebrate** the contributions of those who do.

4. Fill the space. The online collaborative environment won't be very enticing if it starts out empty. No one wants to be the first to post a message, add an event to the group's calendar or deposit a working document. Tim Butler, SiteScape's president and founder, recommends having a team member who serves as a kind of gardener, planting some important information in the online environment before the team gets started and keeping it pruned as time goes on.

The gardener needs to make sure that team members are posting all relevant information to the forum rather than simply e-mailing it to one another. He also ought to seek out "exclusives"—information that can't be found anywhere else—for posting. It's also crucial for employees to find the freshest information online rather than via interoffice memos or another channel.

5. Prod employees to participate. After a few initial interactions with the collaborative system, it's not unusual for employees to drift away. One antidote is to give team members an update on what's happening in the online forum. At Shell, everyone who uses the system gets a periodic e-mail synopsis of the questions being asked and the issues being addressed online, with a URL link to the items being discussed.

6. Promote the benefits. It's natural for employees to resist change. Proponents of collaboration in big companies need to talk about the problem-solving power

of working together. "There's still resistance, but we talk about the benefits at meetings and in newsletters," says Chip Yonkee, manager of e-business at Siemens Energy and Automation in Alpharetta, Ga. "The old way was that you'd spend two hours looking for a file on a server somewhere. The new way is that you can find that information easily online and solve your problems more quickly with help from your colleagues."

7. Celebrate the experts. It may be counterproductive to reward employees for participating in collaborative efforts. "If you offer a bottle of whiskey for every 10th answer to a question, then the value of the community goes down, because the loudest participants are the ones who want free whiskey," says van Unnik at Shell. Psychologist Calmas says that the best incentives for fostering collaboration are "verbal praise, the thrill of making a contribution, working in a productive group and having your ideas appreciated." Rather than punish employees who don't participate in the collaborative environment, celebrate the contributions of those who do.

8. Don't be safe. Allow controversial debates to brew in collaborative areas—otherwise people will avoid having any substantial conversations there. "The stuff that gets people most engaged is the controversial stuff," says Yonkee at Siemens.

9. Let the users rule. "If you put one of these [collaborative] tools in place you have to trust your employees to take the system and mold it to the style and culture of their department," says Dave Griffin, director of corporate technology at SiteScape. "They may not be using it the way you intended them to, but you have to let it play out a little bit. You can't work it all out in advance."

10. Measure the effect. Collaborative tools will be adopted more widely within a company and their use will become more routine if employees and executives understand how much time and money they save—and the savings can be dramatic. For example, at some companies, collaborative technologies have reduced the length and number of meetings. At Shell, van Unnik figures online collaboration saved the company at least \$237 million in 2000. "We only counted clear examples of where we'd earned money or reduced cost by increasing [oil] production or solving problems that are impacting production." ■

Scott Kirsner wants to hear your advice for making collaboration take off within an organization; he can be reached at kirsner@att.net. Send column feedback to ecosystem@darwinmag.com.

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A Failure to Communicate

User interfaces are notoriously tricky, but new research projects could reinvent the way we communicate with our computers



LET'S FACE FACTS. FOR SOMETHING THAT'S supposed to make us so productive, the PC is enormously difficult to use. Compare it with other machines that get a workout every day. Does the television make us use a keyboard to change channels? Hardly. Do we need to spend five minutes booting up our car? No. But the PC retains many of the user-unfriendly characteristics of its early life—the keyboard, the strange commands, the complicated procedures to input information. What we need is a machine that allows us communicate with it the way we want to, not the way we're forced to.

That's why the Defense Advanced Research Projects Agency (DARPA)—those nice people who funded the early Internet—wants a whole new PC user interface. According to DARPA, we now spend so much time putting information into computers, telling them how to carry out certain jobs and processing their requests that we are distracted from the real tasks at hand. Wouldn't it make more sense if the computer could col-

lect the information itself, carry out process-oriented jobs without being told and adapt to the user's needs rather than vice versa? DARPA thinks so.

So the agency has handed out \$10 million (and is soon to announce a second round of \$40 million) in research funding to Carnegie Mellon University, Georgia Institute of Technology, MIT, the University of California at Berkeley and the University of Washington to come up with computer systems that will watch, listen and use artificial intelligence to respond to our every need.

"The most precious resource in a computer system is no longer its processor, memory, disk or network. It is the user's attention," says Daniel Siewiorek, professor and director of Carnegie Mellon's Human Computer Interaction Institute.

The solution, according to Siewiorek, is invisible computing (also referred to as pervasive or ubiquitous computing). The idea is to replace computers that require every command to be typed with computers that use microphones to listen, video cameras to watch and speakers to deliver information to the user. By combining speech recognition, vision and speech synthesis with emerging technologies such as artificial intelligence, these new systems will be able to collect their own data and anticipate the user's needs by watching and using their AI-fueled brains.

Of course, companies such as IBM and Xerox have been throwing money at the user interface Holy Grail for decades, and we're still waiting. Now, however, some basic building blocks such as voice recognition software, artificial intelligence and wireless networking are finally maturing enough to make such visions achievable.

Project Aura

Siewiorek and his crew dubbed their DARPA-funded program Project Aura. He says the final result will be a system that's controlled by speech and uses monitors, microphones and speakers dotted around the workplace as the user interface. It should work something like this: Harry X is a fictitious chief designer who works for a

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product design consultancy. When Harry arrives each morning he needs to respond to voice mail and e-mail, read articles relevant to his area of expertise and review the work that went on in his London office overnight. Today, Harry walks straight to his desk, surfs the Web and types for an hour. With Project Aura, the computer system will create a digital aura for Harry, which consists of things like news articles he needs to read, his voice and e-mail box, and the people he is in regular contact with. The digital aura will not reside on a single PC or laptop as it does today but on the network, and it will follow Harry at the office. He will access this network through sensors that identify him to the system and use the microphones placed around the building to control the computer. That way, Harry can access his voice mail and e-mail from anywhere in the

contact with the Enviro 21.

So an aeronautical engineer, for example, might use the Handy 21 to take photos of damage to a 747 in the field, and then project the video on the nearest monitor once back in the office. He might then talk to the chief engineer about which parts are needed to rectify the problem and have the Handy 21 ask the Enviro 21 (which would have a broadband Internet connection) to find, locate and buy those components.

The Portolano Project

The University of Washington's Portolano Project is building an invisible computing environment for the university's new cell biology laboratory.

"The problem with most cell biology laboratories is that there is really no way to accurately record the

"The most precious resource in a computer system is the user's attention." -Daniel Siewiorek, director of Carnegie Mellon's Human Computer Interaction Institute

building, have news articles delivered to the nearest screen and even send information—a short video of his new prototype, for example—from any location. And the kicker is that CMU plans to build Aura from almost all currently available technology.

Project Oxygen

MIT is taking a slightly different approach. During the next four years, it and partners DARPA, Acer, Delta Electronics, Hewlett-Packard, Nippon Telegraph and Telephone, Nokia and Philips Electronics will invest \$50 million in an attempt to build a completely new system, including hardware, software and network components. Like Aura, it will attempt to remove the complexity of using computers.

Called Project Oxygen, the MIT system will run on two devices: the Enviro 21 and the Handy 21. The Enviro 21 is a workstation-like computer that will be used as a command and control center for video cameras, telephones, microphones and speakers dotted around the home or office. Its user interface is the Handy 21, a type of electronic personal organizer with a video camera, microphone and color screen (but no keyboard) that will be controlled primarily by spoken commands. It'll work like a universal remote control in the home or office, and while on the road it will act as a personal digital assistant that will be in constant

experiment process," says Gaetano Borriello, a professor in the computer science department. "The great majority of what is done is in some biologist's head or in a notebook somewhere."

So UW will outfit every device in the new cell biology laboratory with radio frequency tags to capture and record data. When a biologist places a sample under a microscope the computer control system will know which material is being examined and at what settings. Pipettes containing chemicals will also relay how much liquid is in them and how much was used in a particular experiment. The system will also use speech and vision technology to record the biologist's notes as he or she is working.

Mind you, it'll take between five and 10 years before these systems are ready for prime time. But even now we're moving toward a ubiquitous computing environment, what with the proliferation of PDAs, cell phones, digital cameras and MP3 players. What we need is an uber-architecture that integrates all these devices—and that's where CMU, MIT and company come in. Let's hope that DARPA will be as successful with this project as it was with the Internet. ■

In Vitro columnist Niall McKay lives and writes in Berkeley, Calif. He can be reached at www.niall.org. Send your comments to letters@darwinmag.com.

ENTERPRISE SELF-SERVICE:

A Business Model *for a*

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"Companies looking to transform themselves into e-enterprises or to extend their existing e-business initiatives need a new business model—a new model that fundamentally changes how companies view their relationships with their customers, partners and employees," says Chris Grejtak, EVP and Chief Marketing Officer of BroadVision Inc., Redwood City, CA. "These enterprises need to adopt an 'outside-in' perspective as opposed to the traditional, 'inside-out' viewpoint."

"Known as Enterprise Self-Service (ESS), this new business model allows your major stakeholders to interact with your enterprise in a personalized, collaborative way using the power of the Web," Grejtak says. "ESS means changing all of your relationships—interactions, transactions and services—from a manual, human-assisted paradigm to a personalized, self-service model. The result is immediate business value in the form of reduced costs, enhanced growth, improved productivity and long-term customer satisfaction and retention."

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Grejtak points out that most enterprises today run their business operations using various legacy back-office, financial and human resource applications. Data warehouses and other intelligence and analytic tools also come into play. Associated with these systems is a set of business processes that require expensive, human-assisted services and interactions. CRM and other applications may provide automated support, but call centers,

help desks, hot lines and other internal systems continue to be capital- and human resource-intensive. These support staff and service people devote between 70 and 80 percent of their time to interactions with employees, partners and customers.

"But the biggest problem is that the traditional model imposes a strict way of doing business with customers, partners and employees that is costly to maintain," says Grejtak. "BroadVision is working with companies that have realized significant business value by moving up to 60 percent of their core business processes to an

Enterprise Self-Service model. They are realizing significant cost reductions and dramatic increases in the quality of the interaction between the enterprise and its key constituents."

Leading the Way

Although Enterprise Self-Service is a new and different business model, it already has a proven track record.

BroadVision customer British Telecom (BT), concerned about call

center costs, is converting key business processes to a self-service model. Significant cost reductions and increased revenues have been the result. For example, BT's "Friends & Family" program costs on average \$4.73 per request in the call center and just four cents on the Web. The BroadVision-powered BT.com website generates 100,000 new customer registrations each month and serves more than two million page requests per day. The website now generates more than \$142 million per year in direct revenue by providing advanced personalization and self-service capabilities.

From Promise to Reality

The self-service model is making Web-based cost savings and new revenue streams a reality. Grejtak points to a recent in-depth research study of e-business initiatives, conducted by BroadVision and Surgency, a well-known consulting and research firm. The research involved hundreds of enterprise clients and interviews with an equal number of industry leaders.

The results of this research are summarized in a report that details nine transformational strategies that com-

ucts and services. The software must also facilitate close relationships with application service providers (ASPs), as well as access to exchanges and cross-selling. Reports on customer and end user feedback contribute to improvements in future solutions packages.

At Answer Financial, Inc. (www.answerfinancial.com), an online insurance agency with an integrated call center, BroadVision solutions are used to provide customers with Web-based services that allow them to research and compare various types of insurance policies from some 175 top-rated national providers. By dispensing unbiased information and providing decision tools on policies ranging from life, auto, homeowner and health to pet insurance and home warranties, Answer Financial acts as a one-stop solution for consumers, enabling them to compare hundreds of plans using one site.

Customer Self-Service—This strategy reduces service costs, such as running call centers, by making information immediately available to customers on a 24/7 basis. Customers are empowered to address their issues

tomers extensive, interactive trip-planning capabilities that provide comprehensive information and assistance—from driving directions and road construction updates to hotel and dining reservations. An online road trip guide allows visitors to create and print out their entire road trip by selecting start and end points. The system generates online maps and turn-by-turn driving directions. In addition, visitors can use the website to make reservations through a booking partner called Places to Stay. The website generates substantial sales of Rand McNally atlases, maps and software, as well as revenues from an online shop that carries approximately 4,500 travel-related items.

Customer Lifecycle Management—Designed to cultivate customer relationships from pre- to post-sale and beyond, this strategy allows businesses to anticipate and deliver the products customers want, when and how they are wanted. Supporting systems help personalize customer interactions, identify behavior patterns, support mass customization and enable continuous product innovation. Effective customer lifecycle management builds customer loyalty at every stage in the lifecycle by offering customers personalized, Web-based care through multiple channels and by helping the business target customers with relevant value-added services.

GE Supply, a \$2 billion distributor of electrical, voice and data products, has leveraged its BroadVision self-service site (www.gesupply.com) to significantly increase online revenues and its online customer base. Lifecycle management allows customers to review extensive information and make purchases online. The site automatically provides content relevant to individual users' interests, including featured products, industry-specific information, customer-specific pricing with online quotes, and time-saving ordering tools such as purchasing lists, quick-buy functions and an individualized catalog that remembers previous purchases.



BT's "Friends & Family" program costs on average \$4.73 per request in the call center and just four cents on the Web.

panies have used as they move to an Enterprise Self-Service business model.

These nine transformational strategies include:

Total Solution Provision—This initiative bundles products and services together into a targeted solution, freeing customers from having to integrate separate purchases on their own. The strategy focuses on helping a business coordinate with multiple suppliers and partners. Customer satisfaction is increased because they receive a complete solution from a single touchpoint.

Software enabling this strategy should make it easy to obtain information or access aftermarket prod-

whenever they want. And the business is able to scale services more smoothly than would be possible when customer service is provided solely by call center staff.

Customer self-service requires a system that gives customers online access to and interaction with all their current account information. Applications should enable them to quickly search for additional information and configure a customized solution. These interactive systems also enable self-directed purchasing and exchanges.

For example, Rand McNally's BroadVision-powered site (www.randmcnally.com) offers its cus-

One-to-One Customer Interaction—

By seamlessly sharing information throughout the corporate infrastructure, the enterprise presents a single face to its customers no matter how the interaction takes place or what part of the company is involved. This strategy is particularly relevant for businesses whose products are seen as commodities, which makes service differentiation, branding and trust building critical. It allows the business to learn more about its customers and refine its offerings, building even greater brand loyalty.

This strategy requires software that enables the seamless sharing of information throughout the enterprise. Also required are applications that support continuous learning about customer needs and preferences in order for the business to adapt its product and services offerings.

Circuit City is well known for its high level of customer service, low prices and broad selection of brand-name consumer electronics. The company's "e-Superstore", www.circuitcity.com, is completely integrated with their physical store's back-end systems for order fulfillment and inventory. The BroadVision-powered site allows Circuit City to replicate the customer experience at its Superstores while leveraging the advantages of 24-hour Internet access. In addition to being able to browse, purchase and arrange for home delivery of products, consumers can select and check the inventory of up to three "express pickup" locations, where customers can take delivery of their orders after purchasing online. Because Circuit City's in-store prices are adjusted to compete with local retailers, the e-Superstore automatically adjusts the price to reflect in-store specials at the location chosen by the customer for the express pickup.

Demand-Driven Forecasting and Replenishment—This strategy correlates real-time information on customer behavior and consumption patterns with sales and supply data. Real-time information on supply and demand helps companies reduce

inventory carrying costs. Customers benefit because consumption immediately triggers replenishment, eliminating waiting for purchases.

Achieving demand-driven forecasting and replenishment requires a system that facilitates demand planning, collabora-

Rand McNally's BroadVision-powered site offers its customers extensive, interactive trip-planning capabilities that provide comprehensive information.



tive planning, forecasting and replenishment (CPFR), and make/configure to order features.

RS Components, a major U.K. distributor of electronic and industrial supplies, uses BroadVision One-To-One® profiling and observation techniques to add a personal touch to its interaction with 150,000 customers who evaluate and order more than 100,000 products online at www.rswww.com. Repeat customers are presented with information on special offers that relate specifically to their areas of interest, further driving demand.

Innovation and Collaborative Design—This initiative assimilates partner capabilities and shares customer and product knowledge throughout the extended enterprise during the entire product lifecycle. Particularly suited for emerging marketplaces and R&D intensive industries, this strategy enhances communication among all team members and customers in order to improve product development. As a result, more innovative product designs are created, time-to-market is cut, and sales and profits increase.

Support for this strategy is provided by software that blends concurrent engineering with real-time, online communication. Chat functionality and the ability to share images online are essential. Capturing customer and partner feedback on a regular basis is also a requirement.

One of Taiwan's largest semiconductor foundries uses BroadVision solutions to collaborate with semicon-

ductor partners on product design, engineering, logistics and manufacturing. The site has the requisite scalability to support the manufacturer's rapid growth. The company's website features a "Virtual Fab" window into the foundry's manufacturing environment

so customers can follow their wafers through the manufacturing process. Customers and partners use the website to conduct engineering collaboration, order products, track production data, and access customer service. An Internet conference forum enables direct interaction among engineers for sharing charts, screenshots and individual die images. The highly interactive website allows the foundry to deliver information in real-time, promotes collaboration, and enables the manufacturing of high-quality, leading-edge integrated circuits.

Supplier and Partner Self-Service—Improving supplier and partner access to the enterprise's information and transaction systems is the purpose of this strategy. Because businesses are able to communicate more efficiently with the members of their extended enterprise, they can execute their inter-enterprise plans more cost-effectively, streamline common activities and promote informed, coordinated decision-making.

Supporting systems for this strategy must provide collaborative planning, forecasting and replenishment, direct procurement, exchange applications, standardization and outsourcing features.

Aviall, a distributor for 90,000 aviation-related line items, has created a BroadVision-based website (www.aviall.com) that enables its suppliers to view sales and inventory information in real time, enhancing their product and inventory planning, supply chain management and forecasting. The site feeds outstand-

ing quotes and orders data directly into supplier ERP or MRP systems, assisting them with supply chain management, production and inventory planning and forecasting. In the process, Aviall has forged tighter bonds with its suppliers, boosting the company's competitive advantage.

Employee Self-Service—Enabling employees to take care of routine business using Web-based applications allows them to focus on higher value-added activities. This strategy allows employees to access information and carry out routine transactions related to their employment—a far more productive, efficient and satisfying process than the more traditional, lengthy trips through a bureaucratic paper trail.

Systems supporting employee self-service provide access to information and transactions related to benefits, career training, time and labor reporting, e-learning, travel and expenses.

At Anderson Trucking Service, a BroadVision-powered website (www.ats-inc.com) is helping to grow its business and attract and retain good drivers. The busiest page on the site provides drivers with real-time information on which loads need hauling, a real plus for contract drivers. Drivers who are full-time Anderson employees use the site to update the system on their progress and start the settlement process while on the road, rather than waiting to submit paperwork after the trip is completed. This speeds up their payments substantially.

Community Empowerment—Businesses implement this strategy when they wish to establish and nurture a network of relationships between the business and its customers. This solution creates a website where people with similar concerns can share information.

Systems for this strategy should facilitate content creation and community branding as well as mechanisms for community profiling to ensure relevance. The website should be inviting and easy-to-use.

Using BroadVision software, The Home Depot (www.homedepot.com) offers the expertise of its store associ-

ates over the Web. Customers have access to more than 100 "how-to" projects. One click presents all the information needed to complete a project, including expert tips, skills and time required, plus a listing of tools and materials needed—all available, of course, at The Home Depot. The site's dynamic profiling drives relevant content to visitors using the service, which was built to support 20 million daily visits and 40,000 concurrent users.

Mapping Your Strategy

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BroadVision solutions make these strategies possible. BroadVision One-To-One Enterprise and Content Management solutions, along with BroadVision InfoExchange Portal™, BroadVision Business Commerce™ and BroadVision Retail Commerce™ applications offer you a unified e-business solution for Enterprise Self-Service initiatives. In addition, BroadVision's Solution Value Proposition program offers a Web front-end tool for self-service opportunity assessment; workshops to develop the strategies for ESS solutions; and a methodology to determine the ROI of any e-business initiative.

BroadVision also provides a full spectrum of global services and support to ensure customer success. Included is consulting, training and partner support that involves working closely with platform vendors and application service providers.

"We provide the products and services that allow enterprises to evolve from the old, inward-looking ways of doing business to the new, outside-in paradigm," Grejtak says. "Enterprise Self-Service is a fundamental transformation that will change the way business is conducted for decades to come." •

For more information about BroadVision, Inc., call 1-866-287-6669, email svpmail@broadvision.com or visit www.broadvision.com/transform.

Visit www.broadvision.com/transform to qualify for your free self-service assessment or email svpmail@broadvision.com.

About BroadVision

BroadVision's Enterprise Self-Service applications create immediate business value by transforming the way organizations do business—moving relationships to a personalized, self-service model that enhances growth, reduces costs and improves productivity. Leading global companies use BroadVision to power their Enterprise Self-Service initiatives—using the Web and wireless devices to unify and extend an enterprise's applications, information and business processes to serve its employees, partners and customers in a personalized and collaborative way.

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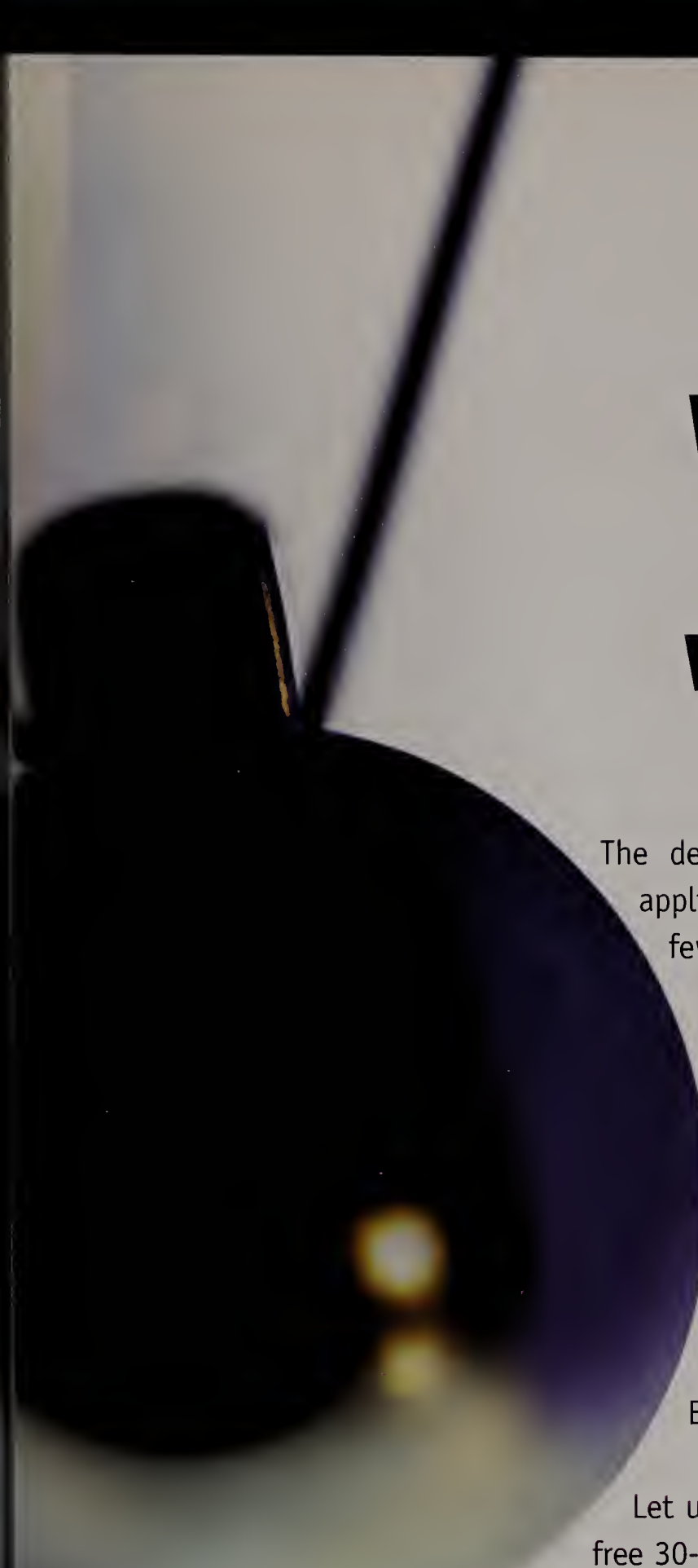
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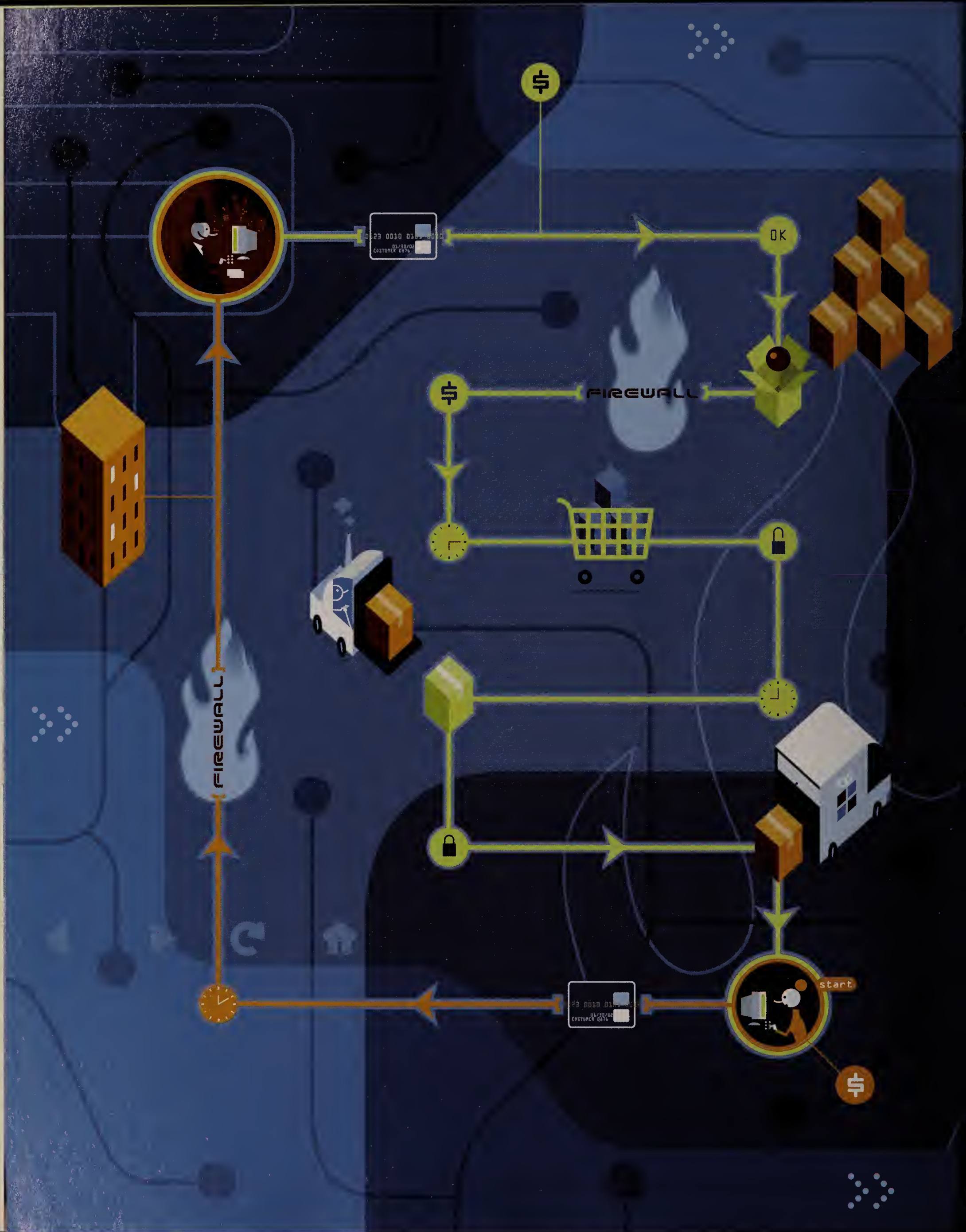
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BY CHRISTOPHER LINDQUIST

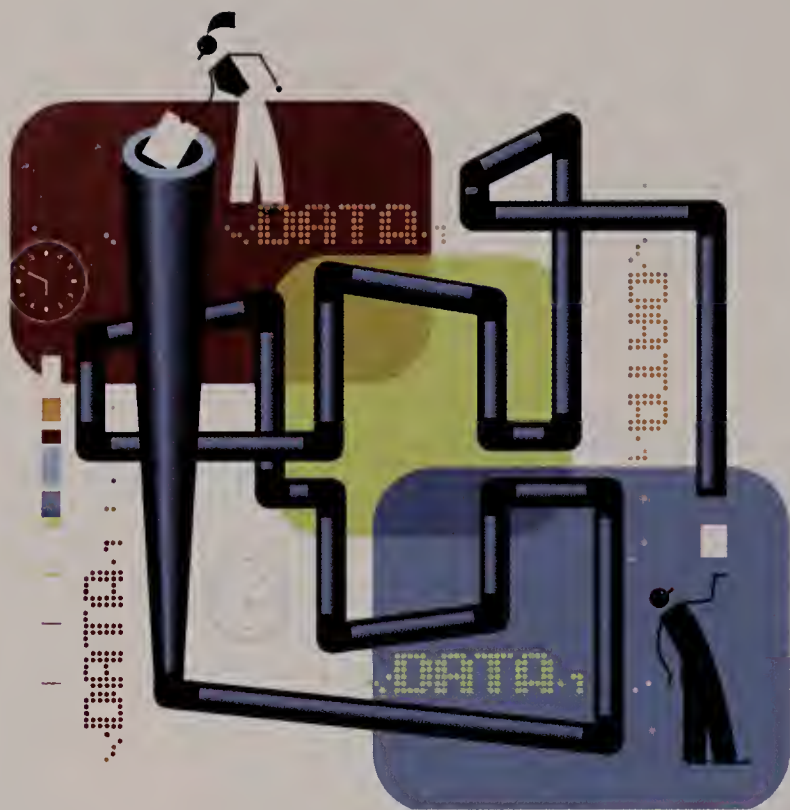
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CLICK. CLICK. BUY. BUY.

To the consumer, purchasing something on the Web is only a click away. But the behind-the-scenes reality of e-business is a far cry from a mouse click, a credit card number and a short wait for the delivery truck to roll up to the door. Dozens of complicated technologies have to mesh to make the sale go smoothly. And if any small link in the series breaks, the whole chain fails.

Of course, most strategic e-business efforts try to accomplish far more than your basic "here are some pictures of my kids" website. Business sites exist to generate revenue, decrease costs and improve efficiency—and as such are far more complicated.

Properly forging the various links for such a task takes time and money—and sometimes lots of both. So before you authorize any spending on your company's new Web project, you need to know what it will do, how long it will really take and what changes—if any—it will require from the rest of your business.



As in the real world of **PIPES** and faucets,
the more twists and turns the **TRANSACTION**
has to make, the **SLOWER** it's likely to move.

The ABCs of URLs

All websites work in pretty much the same way, at least on the surface: The user's Web browser connects to a company's Web server via an Internet service provider. The browser sends a request for files, and the server retrieves the files and forwards them to the user. It's relatively simple stuff.

But all sorts of other elements can complicate the rest of the transaction. For starters, online shoppers and information gatherers will most likely want to treat your site as a business that's open 24/7. If you don't live up to those expectations, you'll lose customers for sure.

In addition, if you take their money in return for goods, you're likely to also collect information—private information—about them. Buyers expect that you will keep that information safe and confidential.

And finally, every nifty new feature—from instant credit authorization to auto-

dated inventory updates to package tracking—requires yet more software, maintenance and money.

As much as you probably don't want to face it, e-business infrastructure involves more than just Web servers and fast pipes. E-commerce can generate huge amounts of data. Every person who simply visits your site to browse puts extra

strain on your resources. And user expectations—such as being able to instantly view previous orders instead of waiting a day or two—means that equipment like those formerly just-fine (and plenty cheap) tape drives will need to be replaced with faster, more expensive disk systems.

Building your site once won't be nearly the end of it. The Web continues to change—and that means constant upgrades and tweaks for the foreseeable future. "I think the CEO is going to be writing big checks for the next 10 years," says John Gantz, senior vice president and chief research officer at IDC (a sister company to Darwin's publisher, CXO Media). "But it's going to cost more the first time to do it right."

On that happy note, we invite you to follow a moment in the life of an e-business transaction.

The Open Internet

This is where the transaction starts. A user enters a site by typing in a uniform resource locator (URL, such as www.darwinmag.com). Up pops the company's homepage. Once the

user finds what he needs, he makes a few clicks to add it to a shopping cart and sends the order through. Voilà!

The Pipes

The transaction then goes through an assortment of "pipes," ranging from relatively slow dial-up lines to high-speed fiber-optic "backbones" that are able to transmit hundreds of millions of bits of data every second. The plumbing analogy isn't too far off: As in the real world of pipes and faucets, the more twists and turns the transaction has to make, the slower it's likely to move. For that reason, connecting your servers as close to a backbone as possible is generally a good—if costly—idea. New "edge of the Internet" services, such as those from Akamai Technologies, can also speed things up by putting pieces of your site geographically closer to your customers. But again, such services increase costs. The transaction may also be encrypted—or scrambled—to keep hackers from stealing important information, such as credit card numbers, as it travels through the pipeline.

Security

Before the transaction is complete, it goes through a series of security systems. The systems, most commonly called firewalls, attempt to make sure that the incoming transaction is a valid one and not someone trying to break into corporate networks. Some security devices, such as intrusion detection systems, attempt to identify suspicious activity—say someone is repeatedly entering an incorrect password. More advanced security systems can even attempt to trace specific crimes—credit card fraud, for example. Without a top-notch security system in place, your site will be open to hackers looking to steal information or merchandise.

darwinmag.com Check out Darwin's
E-BUSINESS LEARNING CENTER to get more
information about websites and your business at
www.darwinmag.com/learn/ebusiness.

Web Servers

After getting clearance from the security systems, the transaction moves on to the site's Web servers. These systems function as the tour guides of e-business. They interpret the requests from customer Web browsers and send back the necessary data. In some cases, the data may simply be a webpage residing on the server itself. But for our transaction, the Web server needs to request additional information from other "application servers" within the company.

Application Servers

Transactions may require information from several applications. A single purchase may need a credit check, an update to the user's buying profile, a request for shipping information and a request for shipment. All those pieces work together to make up the virtual shopping experience. Making them work

together smoothly is another matter; older applications were never meant to talk to each other, let alone to an outside user or—amazingly—to the entire Internet. Integrating all these applications can be one of the most expensive and time-consuming parts of creating an e-business.

People Power

OK, so the credit card cleared, the item is in stock, and the stock pickers aren't on their coffee break. Unless your business is run by robots, it's time to get the people involved again. Depending on your business, this is typically the part of the transaction where someone has to start packaging the merchandise and getting it ready for the delivery truck. As orders are filled, the updated inventory information should flow back to the application servers, along with a tracking number that will let the customers keep an eye on their purchase's status.



The Basics

FIREWALL: A software/hardware combination designed to keep intruders out of corporate networks.

HTML (HYPERTEXT MARKUP LANGUAGE): Basic Web language that specifies where elements (pictures, text) go on a page and what they look like.

HTTP (HYPERTEXT TRANSFER PROTOCOL): The common language that lets Web browsers and servers communicate.

TCP/IP (TRANSMISSION CONTROL PROTOCOL/INTERNET PROTOCOL): A communications protocol that allows computers to speak to each other regardless of the underlying networking technology (cable modem, T1, dial-up line and so on).

URL (UNIFORM RESOURCE LOCATOR): The website's address.

XML (EXTENSIBLE MARKUP LANGUAGE): XML goes HTML one better by letting developers create their own definitions for how text and data should appear on a page. For instance, XML developers could create a flavor of XML specifically for describing accounting or manufacturing information, rather than relying on the more general-purpose HTML.

Critical Questions

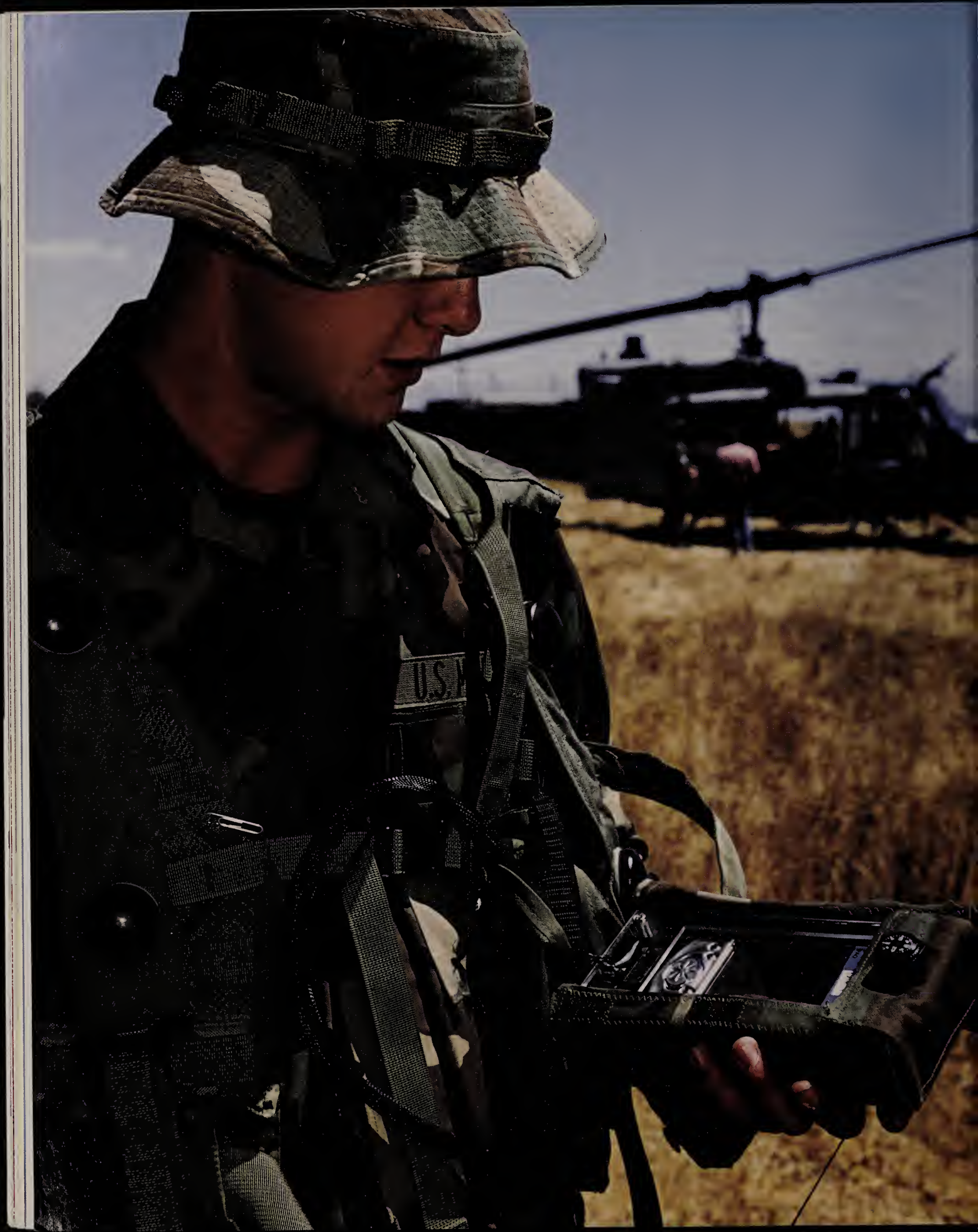
Congratulations! Now that you understand how your website works (well, sort of), you'll want to get started. Here are some queries to keep in mind before you sign the check for that big new Web project:

- Who else will be involved in this initiative? Sales? Advertising?
- Do they have a plan to drive traffic to your site (a Super Bowl ad campaign, for instance)? And, if so, can it handle the load?
- Does creating the site provide your company with an opportunity to change business processes to make them more efficient? For instance, if you're doing something manually now, such as rekeying customer orders into a tracking system, is this the time to automate that process?

- Is this project going to demand more work of your sales and support staff?
- Can you estimate how much additional mail you'll receive?
- Do you need to add extra services before you go to the Web? Sites that don't provide online package tracking, for instance, don't live up to today's consumer expectations.
- Are you going to develop this site on your own, or are you going to use an outsourcing company? Why or why not? (Outsourcing companies usually offer faster speed to market. In-house development can be more flexible in terms of working with your existing business processes.)
- How quickly do you anticipate the need to upgrade the site? What technologies (wireless, broadband and so on) are coming down the pike that you need to prepare for? Are you examining them now and building their costs into the estimate, or will they need more effort and money in the near future?
- What security and privacy precautions are you taking? Do you have a privacy policy for the site?

If it all sounds like a lot of effort, you're right. But not going to the trouble could lead to big problems down the road at a time when going online might not be just a luxury but a necessity. Do it right the first time, or you'd better plan to pay for a pricey overhaul later. ■

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INFORMATION IS A **WEAPON.**

WHAT WILL
HAPPEN WHEN
EVERY SOLDIER
IN THE FIELD
IS ARMED
WITH IT?

By Daintry Duffy

PHOTOGRAPHY BY ROBERT BURROUGHS, UNLESS OTHERWISE NOTED

On land, sea or air,
the U.S. military is
counting on IT to
bring up-to-the-
minute data to
soldiers in combat.





WHETHER ARMED CONFLICTS occur in a once-bucolic countryside, mountainous terrain or urban cityscape, battlefields are confusing places filled with noise, uncertainty and never enough reliable information.

From the rear command positions to the forwardmost points of engagement, decision support suffers from data corruption, knowledge gaps and a crippling lack of timeliness under dangerous, rapidly changing circumstances.

What a modern military wants and needs is dependable real-time intelligence, shared among networked devices that can help dispel the fog that warfare's inevitable chaos generates. To that end, the U.S. armed forces are now jointly developing a battlefield strategy, and sets of systems and mobile equipment that will turn every soldier into both a gatherer and a consumer of up-to-the-instant information about the developing environment.

Welcome to the new world of network-centric warfare, where technology pushes power up to the command level, and information that would normally be received via

a radio and plotted on a map can be readily seen with the click of a mouse. This same technology also pushes power down to the battlefield, to the young Marine who can let slip the dogs of war with the tap of a stylus.

In the not-too-distant future, soldiers in combat will use handhelds and minicomputers to connect to a wireless communications network that tracks other units on the ground, and military assets in the air and at sea.

This real-time tracking capability will not only replace the repetitive and sometimes frantic radio calls to establish a soldier's location but could also turn infantry soldiers into military strategists.

With so much information at their fingertips, soldiers in combat will be able to make field-level decisions about how, where and when to move their troops. For the commander sitting miles away in the high-tech war room of a naval vessel offshore, the wall-size, broad-scale version of a soldier's handheld map will provide a complete tactical picture of the military operation. This eagle-eyed view of the battlefield will give operation commanders highly detailed, real-

Handhelds and minicomputers will give real-time data to operation commanders. But it will also give squad leaders the same information. Will they demand more input into the decision-making process?

time situational information to make decisions faster and target their troops and firepower with greater accuracy.

Of course, such a new approach to technology raises a number of technical and cultural questions for the military. What happens when the network that supports these technologies goes down or is hacked? What happens if the technology falls into enemy hands? Given the power that information has to break down hierarchies, how will the notoriously tradition-bound ranks of the military adapt? Will the brass jealously guard information and the status it provides, or radically change their training methods to build a different kind of soldier? What happens when every squad leader in



the field has the same information in front of him that his commander has? Will squad leaders continue to follow orders without question or will they demand more input in the decision-making process?

As corporations have discovered, engaging technology to empower employees, disperse control of information and flatten the hierarchy can often bring unexpected—sometimes even unwelcome—ripples of change. In testing out these new technologies, the Marines and other armed services are focusing pragmatically on the technology's usability and the challenges of building a strong, secure network. But to their credit, they are also starting to explore the domino effect that these technologies may have on long-standing roles, the new kinds of training that may be required and how the technology will fit into—and perhaps disrupt—military culture.

IF THE FERVOR OF NAVY AND MARINE honchos is any indication, the military's approach to technology is about to change dramatically. In June, 5,000 military personnel from the Army, Navy and

Marine Corps converged on Camp Pendleton, a Marine Corps base near San Diego, for Kernel Blitz—two weeks of high-tech war games. The purpose of the exercise was to demonstrate that America's armed forces are on the verge of taking a quantum leap in their use of technology and to explore its impact on military missions.

Technologies (such as those described in "Ready, Aim, Wired," Page 52) give ground troops not only a better sense of where they are but also a highly accurate perspective of the entire battle landscape—something that until now even their commanders have been without. Military leaders think the technology will make the U.S. forces faster, fiercer, safer and more responsive to the enemy's movements. However, insiders predict that the technology will also transform the military in other ways—making it more democratic and entrepreneurial, and less chained to the command and control ethos that has historically governed every aspect of military life.

One of the central goals of network-centric warfare is to extend the reach of military forces inland, while keeping war-

How will soldiers in the field respond to carrying an additional 17 pounds of computer equipment? Can top brass change military culture to build a different kind of warrior?

ships—such as the *USS Coronado* used in the recent Kernel Blitz exercises—well off the coast and out of harm's way. The Navy's wide-area-relay network (WARnet) is just one of the ways the military plans to expand its reach.

WARnet is a wireless digital communications network that provides ship-to-shore and unit-to-unit connectivity in a 100-by-200-mile area of operations. The WARnet connections are made through a series of sea- and land-based mobile nodes and airborne radio relays. These links allow the same operational picture to be displayed in command centers aboard the *Coronado* offshore, in mobile command centers onshore and on computers carried by Marines engaged in combat.

Unlike an office network where a user has to plug a laptop in to a network connection, WARnet is a wireless network, transparent to its users, that dynamically

reconfigures itself as the nodes—think miniature cell phone towers—move around the battle area. Airplanes, helicopters, ground vehicles and unmanned aerial vehicles (UAVs) carry the nodes, or *packages* in military jargon. The Dragon Eye, a UAV that was tested at Kernel Blitz, is a 4.5-pound aircraft with a 4-foot wingspan that can be dispatched to provide real-time pictures and data on enemy movement and targets in over-the-hill areas that a Marine ground unit can't see.

Information flows into the WARnet from a variety of sources: from a unit commander calling for fire on a handheld, to a battalion commander sending intelligence information via an instant message on his minicomputer, to enemy location information transmitted by a UAV. The epicenter of that data flow is an offshore headquarters (referred to as the ECOC: experimental combat operations center) aboard the *Coronado*. Here in a dimly lit, high-tech work center in the belly of the ship, the combat commander can gather information from across the battle space—air, land and sea—and make decisions based on the constantly changing elements of the operation.

During Kernel Blitz the GPS receivers carried by each Marine allowed Lt. Gen. Michael Hagee, the commanding general of the I Marine Expeditionary Force, to watch a simulated attack from the ECOC

in incredible detail. "We could see the helicopters move and folks coming out of them and moving on to the objective," he says. "Based on enemy intelligence, reporting and UAVs, we could see where the bad guys were as we watched the whole thing unfolding on the ground."

While Marines on land have to make on-the-fly decisions about how to move and where to fire, the officers in the ECOC will often be able to see the enemy approaching before the ground unit does. Not only will they be able to share that information with them by entering it into the WARnet, they can anticipate the unit's needs by sending backup or aerial firepower even before it is requested.

NEW MILITARY TECHNOLOGIES have always outpaced advances in military tactics. In the Civil War, the interior grooves of the new rifled musket caused bullets to spiral when they were fired, making them more accurate at longer ranges. However, soldiers were accustomed to gathering en masse and charging their opponents, waiting to fire until they were in close range. Because they were never trained to change their tactics along with their weaponry, they couldn't take advantage of the new rifle's capabilities.

Similarly, technologies such as WARnet and the gadgetry at Kernel Blitz will be

Ready, Aim, Wired

LAB EXPERIMENTS CAN ONLY PROVE SO MUCH. THE BATTLEFIELD IS WHERE TECHNOLOGY IS PUT TO THE ULTIMATE TEST.

In murky darkness, a dozen Marines scramble through tall grass toward an enemy camp barely visible 200 yards ahead. Somewhere out on the unfamiliar terrain, two other small units are closing in, flanking the enemy on either side. A young lieutenant motions for his group to halt and ready their weapons. But before giving the order to fire, he pulls out a small handheld—sheathed in standard-issue camouflage—and quietly pulls back its cover. On the screen, tiny blue icons dot a map to show the exact location of all the Marines in the area. Tapping on any of the individual icons reveals the identity and exact location of a Marine. Even though he can't actually see the soldiers, the lieutenant knows exactly where they are and can direct his men to aim their fire away from those areas to avoid friendly fire casualties. In the morning, he'll be able to use the same tool to gather status information on supplies and injuries.

At least that's how the military will conduct itself in the future. Today, however, amid the deafening noise and destruction of combat, the bedlam of battle can make it impossible for a ground soldier to assess a combat situation. And although the information technology used by the military has evolved significantly over the years, it has happened only in disparate pockets of the individual armed forces. Moreover, the gadgets and the networking tools of today usually can't talk to one another, and the quickest way for a Marine to find the rest of his unit is simply to pick up a radio.

On a tactical level the military hopes that new breakthroughs in information technology will lift "the fog of war," giving U.S. troops the advantage. "If you are able to detect the enemy at longer ranges, know where you are and where they are better than they do, that's a tremendous advantage," says Andrew Koch, Washington bureau chief of Jane's Defense Information Group.

According to training officers, 75 percent of a Marine's time has historically been spent try-

GIVEN INFORMATION'S POWER
TO BREAK DOWN HIERARCHIES,
HOW WILL THE RANKS
OF THE MILITARY
ADAPT?

ing to make sure he knows where his fellow Marines are so that the operation doesn't endanger them. The ability to track the Marines using GPS could potentially cut down



The military's new technology solves some problems but creates others. For instance, the glow from computer screens could give the user away to the enemy.

on friendly fire casualties—the cause of 50 percent of the USMC losses in the Gulf War.

Moreover, with navigational information in a common database, squad and company leaders can filter out information they don't want to see, localizing the picture so that they don't become paralyzed by information overload.

Using PDAs, Marines can also submit reports, do instant messaging and call for fire by marking a hostile target anywhere on the map.

While all those functions are useful in a theoretical way, the Marines are still figuring out what kinds of handhelds they'll need—whether they should be styled like a PalmPilot or perhaps worn on the wrist—and how they will fit into their normal combat activities. For instance, some laptop-style equipment can add 17 pounds to a Marine's standard issue gear, which can already weigh up to 80 pounds. That's a cumbersome load to carry when you're out in the field for long periods and have to move quickly. "Will corporals or sergeants want to keep their head down looking at their Buck Rogers watch while they're getting shot at?" asks Adm. Dennis Cutler Blair, commander in chief of the U.S. Pacific Command at Camp Smith in Hawaii. "Or do they need to be looking up because the information that might save them is [in the field]?"

First Lt. John Allsup encountered that problem when using his wearable minicomputer during a recent military exercise. "We did have better situational awareness," he concedes. "But when I'm looking down at the computer, it's hard to control my platoon and fight against the enemy."

—D.D.

wasted unless the tactics they support are also examined.

While experiments like Kernel Blitz are helpful, some experts believe that the armed forces will need more than the occasional large-scale experiment to fully understand the forces of change at work within this technology. They will need to fundamentally rethink the structure of their reporting relationships from command and control to one that is more flexible and less hierarchical.

It's a concept that retired Lt. Gen. Paul K. Van Riper of the Marine Corps refers to as "being in command but out of control." He likens the military of the future to a society of ants or termites that perform tasks like gathering food and building structures with no apparent hierarchy. The key is for the whole organization to understand the intent of the operation and organize itself to accomplish that task.

Thus, if you have Marines who understand their mission and purpose, they will organize themselves to accomplish it, and the commander's role is to give feedback as to how well they are accomplishing the task rather than to control every step of the operation. The real fear in employing network-centric warfare is not that troops will do too much with the information that is given to them—dropping missiles at a soldier's whim—but that they might do too little, still waiting for orders rather than taking the initiative themselves.

The burden of making this new technology reach its full potential will not be

felt in the labs where next-generation technologies are being developed every day, but in the classrooms and on the training fields where an advanced version of the prototypical U.S. soldier will have to be built. "They're going to have to have longer service [with the military], and be

darwinmag.com To read about **KERNEL BLITZ** and the 5,000 military personnel involved, visit www.darwinmag.com/printlinks.

more professional in terms of their education and experience," says Van Riper.

Instead of a young sergeant armed with a handheld, the military may want a more seasoned military strategist—perhaps even someone with an advanced degree who can think about what he is seeing in the field within a larger context and keep the technology in perspective. As Van Riper, a self-proclaimed technology skeptic, pronounces, "I'd rather have an expert with a pencil and paper than an idiot with a computer."

The military's approach to testing offers hope that the armed forces will bend the technology to their will rather than simply be led by it. The strength of network-centric warfare, as Adm. Dennis Cutler Blair, commander in chief of the U.S. Pacific Command at Camp Smith in Hawaii, conceives it, is that it is driven from the bottom up. The individuals who have the greatest influence on choosing the most effective technologies to pursue are not the white-coats in the labs but the soldiers in the field who give a great deal of feedback

PHOTO CENTER BY FURNALD/GRAY

Ground Control to Major Tom

A PEEK INSIDE WARNET'S FLOATING HEADQUARTERS

Deep in the inner workings of the *USS Coronado*, a combat commander awaits information from the front lines as it flows into WARnet, the military's wireless digital communications network. Built into the commander's wall-size digital view of the combat area are so-called smart agents that pop up onscreen if a threat is identified. The commander can then consult with the Marine Corps and Navy watch officers who combine the tactical pictures into a common operational picture. As targets surface and the commander sees that action is not being taken, he can interject and assess the problem.

Nearby is the JTF (joint fires) network, which provides WARnet with overall guidance on possible targets in the combat area. Computer stations there are divided into two different technical areas: THE EXECUTION SYSTEMS (where a determi-

nation is made as to which pilot or ground force is best positioned to take on a particular mission), and THE INTELLIGENCE SYSTEMS (where incoming field reports can be examined and vehicles dispatched to check out possible targets). In the center is a knowledge board—a wall with multiple screens—capable of displaying any number of pieces of information on targeting priorities, history on target sites and objectives.

The command center showcases the greatest strides that have been made in network-centric warfare and is a particular source of pride to Adm. Dennis Cutler Blair, commander in chief of the U.S. Pacific Command at Camp Smith in Hawaii. As the senior U.S. military commander in the Pacific and Indian Ocean areas, he understands the traditional boundaries between the services that this technology is going to have to overcome. Blair points out that now—instead of walls covered in acetate charts and yellow Post-it notes—you see information starting to flow digitally across traditional boundaries. "What we're really trying to do is unlock all the combat potential that we have and create a joint task force [of Army, Navy, Air Force and Marines] so that we can use it in nontraditional ways," he says. —D.D.

about their needs, how the technology fares and the glitches they encounter.

WHILE WARNET IS STILL PRONE to spotty network outages, of greater concern is the potential for deliberate outages caused by enemy hackers. Most of the network has been NSA Type 1 certified, which means that it meets the highest government standard of encryption. However, the Navy is not taking any chances and has put the network through a series of penetration tests where internal expert hackers try to bust in. So far none have been successful.

Maintaining the security of the handhelds and minicomputers will be more challenging. In the confusion of combat, they will undoubtedly fall into enemy hands, and without adequate security, it would be easy to send out false data or reports.

The various problems created by tech-

nology are going to introduce a new set of needs and roles within the military. For example, instead of soldiers with mechanical experience, units will need individuals trained as electrical engineers who can fix handhelds and computers that have gone on the fritz. One of the pitfalls of relying too heavily on technology is that it can give the user a false sense of superiority. During the conflict in Mogadishu, Somalia, U.S. troops had all the advantages of technology and weaponry on their side but were still unprepared for the tactics of the tribespeople because they didn't understand their culture. "There's a certain arrogance about the advantages that technology gives you," Van Riper says. What was needed in that situation was not more advanced technology but fighting forces that could think like cultural anthropologists.

The understanding that most senior officers currently have of what this technology

will mean to the armed forces is limited to sound bites and bumper sticker slogans, according to Van Riper. "[They say], 'If you see the battlefield, you win the war. That's like me saying, 'If I see the chessboard, I win the game,' when of course a master would still beat me.'"

While the battle between the technology and the culture of the armed services is far from over, there is some hope—particularly in the Marine Corps, where there's a lot of thought being given to technology and the future of the armed forces. It's a future, says Col. Russell C. Woody, operations officer for I Marine Expeditionary Force, for which the Corps' values of honor, courage and commitment has prepared them. "Even though we live by traditions, the Marine Corps is accustomed to change," he says. ■

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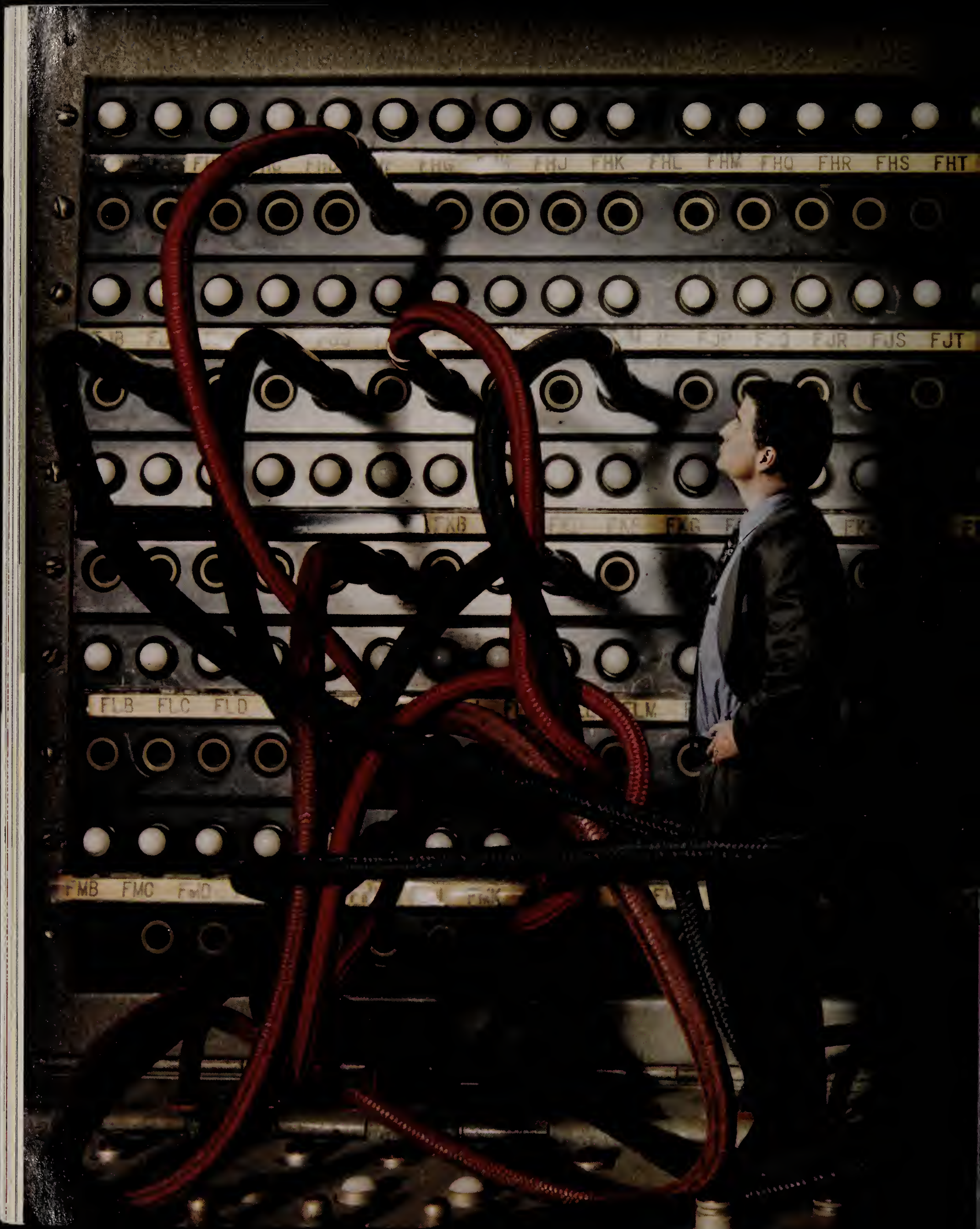


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WHY DO INTRANETS

WHEN HEWLETT-PACKARD'S EXECUTIVE COMMITTEE DECIDED IN JUNE TO ASK ALL EMPLOYEES TO TAKE A VOLUNTARY PAYROLL REDUCTION, THE DECISION WAS POSTED

immediately on the company's @HP portal, the intranet that binds together nearly 90,000 employees in 150 countries. A tool enabling employees to volunteer for the reduction accompanied the announcement. The first day 10,000 employees signed up; within three days 30,000 had volunteered. Kathy Dolan, director of @HP, believes the portal played a central role in making the program work. Instead of finding out by word of mouth whether people were signing up, employees could check the site to find the current tally of volunteers; as the count steadily increased, it convinced more people to participate. Ultimately, more

Many internal Web efforts are doomed from the start. Here's why. And here's how to wring value from your intranet investment. BY DAINTRY DUFFY

than 90 percent of HP's employees volunteered for pay cuts.

That is the power of a successfully deployed intranet. Unfortunately, many companies invest in the seemingly simple project of building a corporate intranet only to have their efforts met with lukewarm success or abject failure. Lack of strategic planning, inadequate executive sponsorship, waning financial support or inconsistent content management spell disaster for most internal websites before they even get off the ground. Although it can be difficult

Today intranets are often just **obligatory corporate shells** that nobody knows quite what to do with.

to measure the financial impact of a failed intranet, the losses are often considerable.

Suboptimal intranets can drain corporate coffers in two ways, says Jakob Nielsen, an intranet pioneer who in the mid-1990s was a lead designer of SunWeb—the original intranet at Sun Microsystems—and is now a principal of the Nielsen Norman Group, a consultancy in Fremont, Calif. First, searching on a poorly organized intranet is a huge time waster. “[Think about] every time you have to download a change of address form or any of those small things that take half an hour rather than five minutes,” he says. “When you multiply those 25-minute periods across a big company, there is a very direct and very explicit loss.” Second, countless decisions are made every day based on low-quality information because employees often can’t find the data that they need on the intranet. Some might say the cost of ineffective intranets is incalculable, but Nielsen’s willing to take a stab at the math. (See “The Costs of Running an Intranet,” Page 62.) He estimates that if you

multiply the number of people in the world using intranets by the number of minutes they’re wasting on them each day, it’s approximately a \$1 trillion problem.

WHAT WENT WRONG?

The fact that many internal corporate websites go unused—or worse, waste employees’ time—is vexing, given the alluring promise of intranets. The same technology that made the Internet a revolutionary communications tool was supposed to revolutionize the corporation as well. The intranet would give employees access to the latest news about the company, become a repository for the wealth of knowledge inside employees’ heads and virtually eliminate paper, saving hundreds of thousands of dollars in printing and processing costs. And in doing these things, it was supposed to weave the fabric of the corporation ever tighter. So what happened?

The very ease of use that makes the Web so appealing was the undoing of many intranet efforts. Initial enthusiasm for the technology quickly outpaced any sense of self-discipline. Small groups of techies, librarians and knowledge management ideologues built most of the early intranets. But as Web publishing tools proliferated, people throughout the company started cranking out content like crazy and posting it willy-nilly. There were no consistent design templates, style guides, navigational techniques or structured databases to provide any semblance of order.

“It was a gigantic intra-mess,” recalls Howard McQueen, CEO of McQueen Consulting in Baltimore and an early

intranet architect. Many employees were spending a great deal of corporate time and energy creating sites and posting information—some of it useful, some of it junk—with little or no governing authority; meanwhile fellow employees wasted time in fruitless searches for valuable content on the intranet and often gave up in frustration.

The growing popularity of the Internet as a way for companies to communicate with their customers only added to the problem. Many intranets quickly became the poor stepchildren of their companies’ flashy Internet site. After all, went the executive reasoning, why throw money at a site that only your employees will see when there are valuable customers to be wooed? Many companies stopped funding internal Web efforts but hung on to their intranets because every company is supposed to have one. Today intranets are often just obligatory corporate shells that nobody knows quite what to do with.

Despite the plethora of failed intranets, some shining exceptions like @HP prove that devoting the appropriate resources and attention to internal websites can really pay off in the form of greater efficiency, knowledge sharing, employee productivity and cost savings. Now that corporate penny-pinching is back in vogue, such benefits are more appealing than ever. For companies that have focused their attention in recent years on high-flying B2B and B2C initiatives, now is a good time to turn inward and refocus on the traditional tenets of business—including ensuring that employees have the tools they need to be productive. “The business has to run properly again,” says

The Basics

INTRANET: An internal website offering content and services to employees. Although it may link to the Internet, an intranet cannot be accessed by the general public.

CORPORATE PORTAL: An internal website that provides proprietary corporate information to employees as well as access to selected websites, such as those of suppliers. Individuals or user groups are given the ability to customize the portal page, which includes a search engine for internal documents.

McQueen. "And that really spells good times for the intranet." Here's a look at many of the common pitfalls of intranet development. Knowing what they are can help you avoid them—and get your money's worth—the second (or third or fourth) time.

INSUFFICIENT PLANNING

When you launch an intranet, it's easy to get caught up in all the possibilities: the technologies and services it will offer, what the site will look like, and how to get people to use it. Planners often overlook why they are doing it in the first place. "There are a million distractions" in the intranet creation process, says Ben Goodman, founder and president of New York City-based Web design and development company First Light. "You can do employee communications, Web enablement and project management, but without some kind of clear decision-making framework that looks at how [the intranet] will affect your strategic objectives, it will become a black hole."

At Los Angeles-based Occidental Petroleum, adding such a framework made the company's third attempt at building an intranet a success. In previous iterations, chaos reigned as each department built its own site without central oversight. Now, says Bill Dykes, director of communications and Web development, each internal site (there are hundreds) has to conform to basic structural and navigational guidelines. On orders from President Dale R. Lawrence, each website proposal must have a site development plan that includes a value analysis of the site's offerings, specifies the strategic business objectives and describes

the content. The plan must also spell out where data will be housed, how the site will be marketed to its constituency and what training will be required.

Although Occidental hasn't explicitly measured the value of cracking down on renegade intranet sites, other companies have. When Hewlett-Packard's @HP portal and its services went live in October 2000, the initiative reduced the number of internal websites by 2,000, delivering in six months a run rate savings of \$50 million annually on the company's initial \$20 million investment. The company was able to eliminate benefits and payroll paperwork, streamline processes such as travel bookings, eliminate the need for call centers, consolidate websites, and reduce costs for printing, fax machines, copiers and servers.

IGNORING THE USER

Many intranets languish because they don't deliver value to employees. Stale content and lack of meaningful service offerings are, rightfully so, a big turnoff. The key to

choosing the right blend of content and services, according to McQueen, is remembering that your employees are selfish. Approach what will be on the intranet from the employees' perspective: Give them things that will help them do their jobs, and don't waste their time.

The best way to determine your employees' needs is to go right to the source. At Allied Van Lines, Senior Manager of Strategy and Development Annette Pierson emphasizes the importance of involving Allied's 600-plus agents in every new intranet product. Before introducing a move-management system, the company beta tested

the new service with a core group of move coordinators in the field. "They helped us identify functionality that needed to be changed or enhanced," says Pierson. Last fall Allied redesigned the user interface based on coordinator feedback.

When intranets lack fresh, relevant content, managers have usually failed to entrust content ownership and management to those closest to it. To encourage topic experts and authors to contribute and maintain their own content (within the intranet's guidelines) companies should consider offering incentives for contribution. At Chicago-based Andersen, where the ability to capture and retain the knowledge gleaned in consulting engagements is central to the company's expertise, contribution to the intranet is an element of each employee's performance review. "There is often a disincentive to share knowledge," points out Mark Allen, director of Internet services at Andersen, "especially in a weakened economy when employees worry that if they put everything online they'll reduce



Many intranets languish because they don't deliver value to employees.

jakob

NIELSEN

GROUP



their own relevancy and importance.”

To ensure that employees draw upon the new content and services, companies should shut down access to that information by other means. For example, remove the HR forms from the supply closet if you want employees to use the new HR self-service area on the intranet.

LACK OF ORGANIZATION

Finding information on your intranet shouldn't be a game of hide-and-seek. Yet companies often complicate the employees' task of finding what they need by basing their intranet design on their organization chart. This creates or perpetuates individual informational silos in HR, benefits, marketing and sales, making it difficult for employees to transact business.

“Your employees don't know what HR is and they don't care,” says Lisa Sulgit, founder and evangelist of Lisa@sulgit.com, a New York City-based Web consultancy. “They just want to get the stuff they need.” She recalls that Prudential had a pension calculator on its intranet that few employees were able to find; it was in the IS department's section of the website because the tool had been created by IS.

Sulgit, who has consulted with and worked for companies including Con Edison, Pitney Bowes and Time Inc., recommends that companies organize their sites by scenarios. Have people go on the site and try to manage life events like having a baby and look at each step, such as changing medical information or setting up a maternity leave. Although these changes involve multiple departments, the process should be seamless.

Companies also need to consider search capabilities and taxonomy. Everyone has had the frustrating experience of having an Internet search engine recommend 15,000 (mostly useless) links. As intranets grow in breadth and depth—IBM's intranet is now

JAKOB NIELSEN cut his teeth as the usability lead for SunWeb, the original intranet at Sun Microsystems, in 1994. Today, he's a principal of the Nielsen Norman Group in Fremont, Calif.

Darwin: What intranet metrics should companies pay attention to?

Nielsen: The simplest one is a usability metric. Define three or four things that you'd like people to be able to do with the intranet and have 10 people try to do them. I bet people will be stunned at how long it actually takes average employees. We find it will take people half an hour to download a tax form for changing their withholding or some other really simple thing.

Are the number of hits a site gets or cost savings germane?

I think those are the wrong statistics to look at, because more traffic is not necessarily better. And the purported cost savings of putting something on the intranet is only a cost saving for the department that did it. It does not take into account the time investment of the employees in all the other departments who now have to struggle because it's too complicated. What is the impact of that on employee productivity? That's where I see big problems, and that's what's usually not measured.

What lessons have you learned in your years of work with intranets?

There is a tender balance between too much and too little central control. If you have an intranet where nothing can happen without going through five

committees, well, guess what? Nothing will happen. More often, people will put stuff up without asking anybody and there will be no structure, no way for people to find what's on the intranet.

You have to have a lot of follow-up and evangelism when you try to instill consistency in an intranet because there is so much departmental turf protection. They are against the notion of somebody else telling them what to do with their material. Yet otherwise you have chaos. So, you have this delicate balance between letting everybody loose, which leads to chaos and low productivity, and too much heavy-handed enforcement.

There is virtually never a budget for an evangelism program, but it's very necessary. A large number of people suddenly are being turned into publishers and application providers. These are roles that they have not traditionally had, so you need to educate them.

Are there other keys to creating a successful intranet?

An intranet is an employee tool, and the way to get a good employee tool is by studying people's workplace behavior. When you do, you'll often find people using cumbersome work-arounds.

With studies, you can identify big time wasters where there's an opportunity for a simple little tool that could help people. Those are the kinds of things that really grab people and make them feel happy about [the intranet]. Give them a little tool that in two or three screens will save them 10 phone calls.

—D.D.



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THE COSTS OF RUNNING AN INTRANET

INFRASTRUCTURE AND STAFFING COSTS ARE ONLY THE TIP OF THE ICEBERG

Cost area	1,000 employees	10,000 employees
Infrastructure	\$70,000	\$200,000
Central staff	\$200,000	\$600,000
Content/service production and maintenance	\$670,000	\$2 million
Users' wasted time	\$400,000	\$4 million
Total cost	\$1.3 million	\$6.8 million

ESTIMATES ARE AVERAGE ANNUAL EXPENSES SOURCE: JAKOB NIELSEN, NIELSEN NORMAN GROUP, 2001

bigger than the entire Internet was a couple years ago—they are becoming just as difficult to sift through for relevant data. Pitney Bowes, which has to deal with a lot of regulatory documents, created an intranet taxonomy that's very specific to its business—in essence, a corporate vocabulary that helps employees find what they need.

Many companies neglect to build metrics into their intranets, so they have no way of knowing what kind of content is being accessed or which tools are used. Before Occidental added its first site analysis tool in 1998 to measure intranet usage, the company's best guess (based on the number of calls when the site went down) was that a few hundred employees out of a few thousand were visiting the site. In fact, more than half of all employees were visiting the site at least daily but weren't staying. Until then the company hadn't realized the tool's strategic potential.

NOBODY IN CHARGE

Since multiple departments have to cooperate to make an intranet successful, governance can become a sticky issue. Companies often delegate ownership to a single department that's ill-equipped to handle the project—or worse, split ownership among a triumvirate of departments, usually IS, cor-

porate communications and marketing. Politically, splitting ownership is a huge mistake and frequently leads to corporate infighting and finger-pointing when something goes awry.

The strongest department—or the one closest to the core of the material—should lead the project, according to Sulgit. She also recommends an oversight committee of stakeholders from all departments involved in the site. It's important to have a champion for the site as well, an internal cheerleader who can get people involved and interested in the intranet. "The leader should be somebody who can reach out

beyond politics and gather a team to really invest in the intranet and believe in it," says Pamela Patton Cone,

former senior manager of Web development at AOL Time Warner in New York City. "It should be someone with terrific corporate savvy who can bring together a team and make them feel they're contributing to a revolution."

MANAGEMENT'S DISCONNECT

The most critical support for an intranet project, however, has to come from the top. Many companies never achieve this buy-in because project leaders fail to communicate effectively to the management team what

the intranet will achieve. Executives don't want to hear about all the bells and whistles of HR's new Peoplesoft system; they want to hear that it will let them speed up the hiring process by 15 days.

CEOs can avoid this communication problem by appointing an executive sponsor, whose job is to probe for the concrete business value of the project and communicate it to upper management in language they understand. This individual should also be in charge of rallying management's fiscal and strategic support.

If an intranet is effective, executives often aren't prepared for the resulting cultural changes. "Senior executives will embrace the idea of empowering employees by giving them direct access to information," says First Light's Goodman. "But in reality, that has some pretty radical implications." Intranets tend to flatten the corporate hierarchy. This can be scary to executives who, after posting a memo to the ranks on the intranet, can suddenly find themselves deluged with employee feedback. Rather than fearing this aspect of the intranet, executives should focus on the benefits of being able to communicate strategy and vision more directly to employees and leap at the chance to take the corporate pulse.

Sal Rasa, a former consultant with Watson Wyatt in New York City, recalls a study of CEOs' biggest regrets upon leaving office. Many said that they had dismissed the issue of communication as "soft" only to realize later that the unleveraged knowledge of employees was one of the biggest inhibitors to value creation. "The CEO should be the one setting the tone for the [intranet's] value," says Rasa. "Anything the CEO does to undermine it will be as profound as what he does in support of it." ■

Is your company's intranet a success or a flop? Write to Senior Editor Daintry Duffy at dduffy@darwinmag.com.

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SEEDLINGS

By Meg Mitchell Moore



During the dotcom revolution, a foosball table in the middle of an office spoke volumes without uttering a word. It said, We are young and hip and pierced in multiple places. It said, We sleep on the floor next to our desks, and we like it. It said, We are going to get that next round of funding, dammit.

So what the heck is a foosball table doing in the offices of a 136-year-old, \$49 billion agricultural food and trade company? The short answer is that it's mostly just taking up space in a corner of Cargill's sprawling headquarters in Wayzata, Minn. The longer answer is that it

AGRICULTURE GIANT **CARGILL** IS HOPING AN INCUBATOR UNIT WILL

serves as a tangible reminder that although Cargill may be an old company, it's thinking about business in new ways.

The table belongs to the company's E Ventures group—a 2-year-old division whose mission is to search out, invest in and nurture (through managerial and administrative support) promising Internet and technology startups. But E Ventures isn't a typical incubator. Unlike the speculative incubators of the dot-



EVentures President Jim Sayre says companies that want a healthy return on VC investments need to give their startups plenty of time to grow.

com era—which emphasized short-term profits and immediate IPOs—Cargill fully expects that its investments won't pay off for years (see "A New Way to Grow," Page 67). Moreover, it has put decades of industry experience—and corporate muscle—behind the effort. This old-line company wants to build long-term viable businesses that tap into disruptive technologies. By doing so, Cargill hopes that EVentures will bring promising new ideas and technologies into the company's decidedly old-economy businesses of agriculture, food, metals and minerals, and transportation.

The largest privately held company in the nation, Cargill seemed to be doing fine without a corporate venture group as the millennium approached. But 1999 sales had actually declined, to \$45 billion from \$51 billion the previous fiscal year. (This, in the middle of a booming economy.) So company executives started searching for ways to revitalize Cargill's bottom line, says Tom Erdmann, one of the managing directors for EVentures. Intrigued by the possibilities of the then hot Internet, which offered unprecedented access to information

PHOTO BY ANGIE WYATT

PRODUCE A BUMPER CROP OF E-BUSINESS STARTUPS



and the ability to build stronger customer relationships, the company put together a strategic plan in 1999 that aimed to grow revenues by focusing on the customer. Part of that plan included EVentures, which Cargill saw as a good way to learn about—and possibly profit from—digital technologies by using its own industry expertise and its position as a huge corporation to make smart investments. “We decided to pull up and devise a long-term corporate strategy for e-commerce in Cargill,” says Jim Sayre, president of EVentures.

The result: Cargill’s corporate leadership team approved the creation of EVentures, a business unit with its own financial goals, which now employs more than 20 people in offices in Minneapolis, Silicon Valley, the United Kingdom and Singapore. Today, the EVentures group has invested in seven B2B marketplaces that roughly parallel Cargill’s

EVentures Managing Director Tom Erdmann found that contact with the incubator’s startups helped bring an entrepreneurial flavor to Cargill.

own lines of business, including GSX, a steel exchange, and LevelSeas, a marketplace for bulk shipping (for a complete EVentures portfolio, see “EVentures’ Portfolio,” Page 70). It’s also started investing in technology startups such as DemandTec, which offers a price optimization service, and EPropose, which builds transactional and exchange technology.

Cargill hopes that its emphasis on long-term commitment—as well as its canny use of industry expertise and an intricate network of business relationships—will help the startups thrive. The company has come up with the following clever ways to put its corporate weight behind the fledgling com-

panies. Like any good farmer, Cargill knows that young seedlings grow best with loving care.

Trolling Industry Waters for Investors

When EVentures executives first came up with the idea for Rooster.com, an online agricultural marketplace that allows farmers and suppliers to buy and sell fertilizer and other supplies and equipment, executives knew they’d have to overcome agriculture’s famously slow acceptance of new technology, as well as competition from other agricultural startups. So Cargill hedged its bets by persuading industry experts like chemical giant Dupont and Cenex Harvest States, a producer-to-consumer cooperative system, to invest in Rooster.

According to Ben Arndt, Rooster’s former marketing director, that roster of industry investors has given the company some vital credibility. “One of the things that made Rooster attractive to a lot of the people who came here was the fact that we had Cargill and the industry players versus a VC. It’s a completely different dynamic,” Arndt says. For example, venture capitalists often take a learn-as-you-go approach, gathering industry understanding even as they open their wallets. But at Rooster, the founding companies dispense deep industry knowledge as well as capital funds. Arndt also finds that his industry backers help eliminate some of the inevitable questions from potential customers about the viability of dotcom startups in the current business climate. “As we try and sell our products, we get: ‘Is dotcom still in?’ ‘Is it safe?’ ‘Are you going to go out of business?’” Arndt says. “We try to say, ‘Please don’t lump us in. We are backed by the industry.’”

Lending a Hand at Startup Time

Borrowing from the Amish, who gather as a community to help each other with big

A NEW WAY TO GROW

tasks, Cargill and other E Ventures investors send employees to each startup for a 60-day barn-raising period to help with tasks such as human resources and accounting, while executives from the founding investors scout for a high-end management team. "All of us were trying to accelerate the development of the business and make people available until a permanent organization could get created," remembers Robert Lumpkins, who as vice chairman and chief financial officer of Cargill helped recruit Rooster.com's management team.

According to Nicole Weber, a senior analyst at IDC's Internet Services Research (a sister company to *Darwin's* publisher) and author of a 2000 report on corporate incubators, helping with such tasks as business development and executive recruitment is a significant differentiator for incubators such as Cargill's. "It's extremely important, and independent incubators fail to do that," she says.

Erdmann, who spent nine months participating in two E Ventures startups, says Cargill employees were palpably excited at the prospect of helping out. "We had people knocking on the doors, saying, 'What can I do? Anything I can do to help I'll do,'" says Erdmann. Barn raisers happily tackled tasks such as hooking up the technology infrastructure and setting up the offices, he says.

The eagerness is simple to explain. "Here was a chance for employees to get an inside look at entrepreneurial, startup dotcom organizations," Erdmann explains. "It was fulfilling and educational." He adds that Cargill employees took part of the culture, excitement and buzz back to the corporate offices when they returned. A few people even stayed with the companies they helped build, leaving the comfort of working for an established company behind. "They went into these companies with no safety net," says Erdmann. "This wasn't, 'If

CARGILL'S INCUBATION MODEL EMPHASIZES LONG-TERM GROWTH OVER SHORT-TERM PROFITS



Cargill isn't the first company to build an incubator. Indeed, similar ventures are under way at Eastman Chemical and Sony, to name just a couple. Moreover, the recent implosion of many dotcom-era incubators—mostly for-profit outfits started by various investor types—has people skeptical about the validity of the incubator concept, in which deep-pocketed investors offer financial, managerial and administrative support to startups in return for equity. But E Ventures' business model differs from the speculative incubators of the late '90s in some important ways, says Nicole Weber, a senior analyst at IDC's Internet Services Research (a sister company to *Darwin's* publisher), and author of a 2000 report on corporate incubators.

For example, many dotcom-generation incubators were interested in a short-term ROI. And although some were led by seasoned VCs, many more were formed by newbie investors who lacked the contacts necessary to nurture its startups, says Dinah Adkins, president and CEO of the National Business Incubation Association in Athens, Ohio.

Now that the market has turned, however, Weber thinks that many corporate incubators will give up too. "A lot of the companies won't stick with it," she predicts. But Weber says that Cargill has bet on a different business model, one that has more potential but is harder to sustain: using new technologies such as the Internet to build long-term, viable business models.

—M.M.M.

things don't work out, come on back.' It was a high-risk decision and also evidence of the passion and excitement they saw."

Managing Director Deepak Malik, who helped GSX get off the ground, came away impressed by the knowledge shared by company employees. For example, teams from Cargill came in to help the new company understand market and customer segmentation, and analyze supply and demand in the steel industry. "This is big business," says Malik. "And these folks understand the nuances."

Sharing Industry Experience

The advice doesn't stop after the barn raising. At many of its startups, E Ventures sets up advisory boards or designates a personal adviser to help the new company keep the voice of experience alive and well. For example, Rooster.com has built what it calls a founders' operating committee (FOC), made up of businesspeople who represent the initial investors.

The FOC members function as resident experts on the needs of the industry. "They participate in the day-to-day business decisions," says Arndt. "And they can connect [the startup] quickly with the right people to collaborate on projects or obtain information."

Arndt also says the FOC's contacts are invaluable—and so is its understanding of the sometimes complex agriculture industry. For example, FOC members from Cargill have helped Rooster executives gain access to business units that could ultimately wind up as customers, like the Animal Nutrition group. "The value of the FOC is the access it provides to key decision makers within its own organizations to help us confirm which new products and functionality to develop, and which ones we should enhance," says Arndt. He says that the Animal Nutrition group's early

feedback ultimately helped Rooster refine its products to fit the market more quickly.

Knowing When to Let Go

For all the help Cargill gives E Ventures' companies, it doesn't treat them as corporate properties. Instead, Cargill insists on the independence of the new companies, similar to adult children who have moved out of the house but still hope for sizable checks in their birthday cards from mom and dad. "Cargill and other investors bring

wealth and knowledge of the industry, and they bring liquidity," says Lumpkins. "But Rooster is an independent company, and we think it's very important that it be independent."

This means that the companies make their own decisions on issues ranging from hiring to further fund-raising. For example, Lumpkins points out that LevelSeas, the London-based bulk shipping marketplace, has taken on more than 20 investors since its inception, diluting the stakes of the

founding companies. "If Rooster goes public—and we view it as a company that will go public someday—all the leadership stakes the founding members have will be reduced substantially," says Sayre. But that's OK, notes Dinah Adkins, president and CEO of the National Business Incubation Association in Athens, Ohio, because return on equity isn't the sole motivation for corporate incubators. Companies such as Cargill hope that their e-business units will not only deliver profits but infuse the corporate parent with innovative technologies, pioneering business strategies and the in-your-face attitude of gutsy startups.

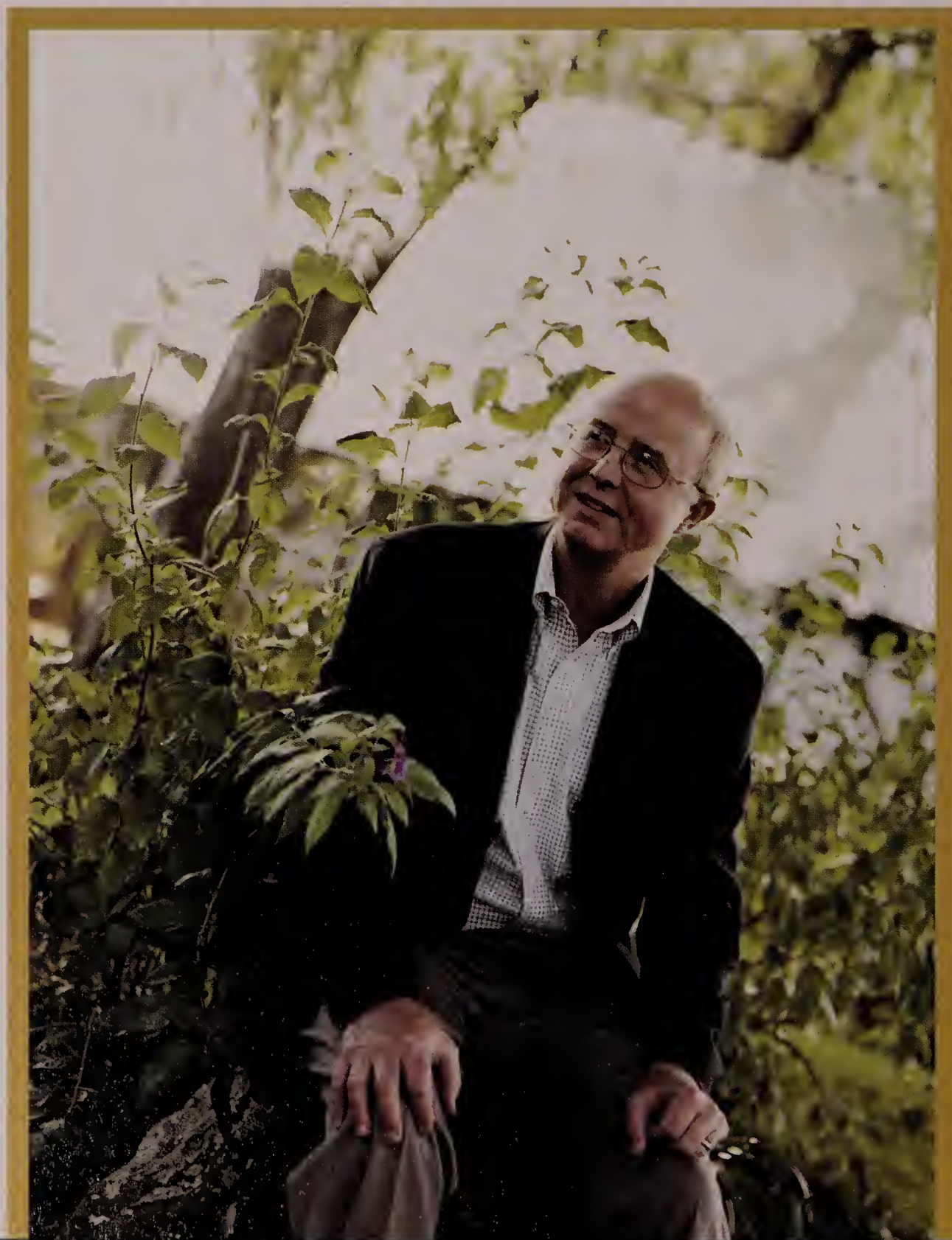
Now that E Ventures has helped develop marketplaces for many of Cargill's major interests, the group's focus has shifted to refining the startups' business models and product lines. "When you start venture-type companies like these you're never sure what the customer wants and needs," says Lumpkins. "There's no question that we have modified our offerings as we've better understood what the customer is willing to pay for." NovoPoint, for example, began as a mostly transactional system for the exchange of food and beverage ingredients. Now it includes supply chain visibility, order tracking and contract management, all of which work toward improving customer and supplier collaboration.

Sayre emphasizes that like NovoPoint, most of the new companies began as B2B marketplaces and have since expanded beyond the basic marketplace concept. "In the end, it is the unique services that they offer to industry participants that will define their growth," he explains.

As the economy continues to sour, is

Cargill CFO Robert Lumpkins says that Cargill and other investors contribute a wealth of industry knowledge to E Ventures' fledgling companies.

PHOTO BY ANGIE WYATT



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Cargill afraid that the EVentures group was a good idea that came at a bad time? If so, no one's admitting it. Despite a 25 percent drop in Cargill corporate earnings from 2000 to 2001, Sayre says, the company remains committed to the incubator and is willing to wait for EVentures' payoff. (According to IDC's Weber, that's a luxury that comes with being a private company.) And though Cargill won't disclose financial results for its new investments, executives do offer some hopeful tidbits: GSX has traded more than 1 million metric tons of steel, for example, while Rooster.com's crop marketing system is continuing to gain acceptance.

"The curious thing is that a lot of people go on Internet time in terms of expecting results. But building solid companies just can't get done on Internet time," says Sayre.

Adkins applauds that attitude. "The fact of the matter is that growing a substantial business can't be done in a short amount of time," she says. "We've heard a lot of hype over the last two or three years based on a fantasy world."

And IDC's Weber thinks Cargill may just be able to cut through that hype. Cargill has surpassed many other corporate incubators in its ability to integrate smart ideas into its strategy, such as involvement in their advisory boards and use of industry connections to help their portfolio companies tailor their offerings, she says.

Sayre admits that EVentures is prepared

for some winners and some losers. "That's no different from any other venture fund perspective," he adds. But it is a far cry from the incubator climate of the last few years. With some time on their hands, the EVentures group is waiting and seeing. It's not

such a bad fate. While they're waiting, they can always play foosball. ■

Send your comments about business incubators to *letters@darwinmag.com*. Meg Mitchell Moore is a freelance writer based in Marblehead, Mass.



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Industries, Gold Kist, IBP,
Tyson Foods

Rooster.com

Minneapolis
www.rooster.com
INDUSTRY: Agriculture
FOUNDING COMPANIES:
Cargill, Cenex Harvest
States, Dupont

The Seam

Memphis, Tenn.
www.theseam.com
INDUSTRY: Cotton
FOUNDING COMPANIES:
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owned), Dunavent, The
Plains Cotton Cooperative
Association of Texas,
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Catch a Wave

Bose wants to sit on top of the digital audio world with its Wave/PC

ROCK AROUND THE CLOCK Until recently, most of the products for playing and recording MP3 digital audio music came from relatively unknown makers. Now Bose—a big name in the high-quality audio field—has entered the MP3 market with the **Bose Wave/PC**, a sharp (if pricey) combination of speaker system, clock radio and computer audio manager.

The Wave/PC shares the same wedge shape and smooth, rich sound as Bose's famous Wave radio. Only instead of standing alone on your kitchen counter, the Wave/PC attaches to your PC's serial port and sound card via a 15-foot cable. (Bose planned to release a USB version last month.) Next, you install the included Wave/PC software. The whole installation takes less than 30 minutes.

Once you have the system set up, you're ready to rock. You can listen to MP3 and WAV digital audio files that you create from your own CDs or download from online music sites. You can also scan for the thousands of radio stations that broadcast over the Web from around the world (the software includes preset sample sites, and you can add your own). If you're looking for something more old-fashioned, you can listen to local broadcasts on the AM or FM bands and even play back CDs through your PC's CD-ROM drive.

The Wave/PC doesn't stop with mere playback, however. The software can record CDs to your hard drive for later listening. The

software even searches an Internet database and automatically displays artist, album, track and other information every time you insert a CD. Creating customized playlists—let's say you like to cool down from the Stones' "Sympathy for the Devil" with Pavarotti's "Core 'ngrato"—is as simple as dragging and dropping the songs you want to hear. The software's search function makes it a snap to find any piece of music you want in under a second, even if you have thousands of songs recorded. And the included credit card-size remote control lets you access your PC music files while lazing in the Barcalounger across the room.

It all adds up to an audibly exciting package, with one important caveat—the dollar signs. At \$449 retail, this sound system is nearly as pricey as a low-end PC and far more costly than some very good, traditional PC speaker systems (such as Cambridge Soundworks' \$100 "SoundWorks" system). Worse, to take full advantage of the Wave/PC, you need to leave your PC on all the time, which wastes power and puts wear and tear on expensive computer components.

The Wave/PC's box claims, "At least one belongs in every home," but at this price, it'll be only in homes with money to burn.

—Christopher Lindquist

nitty
gritty

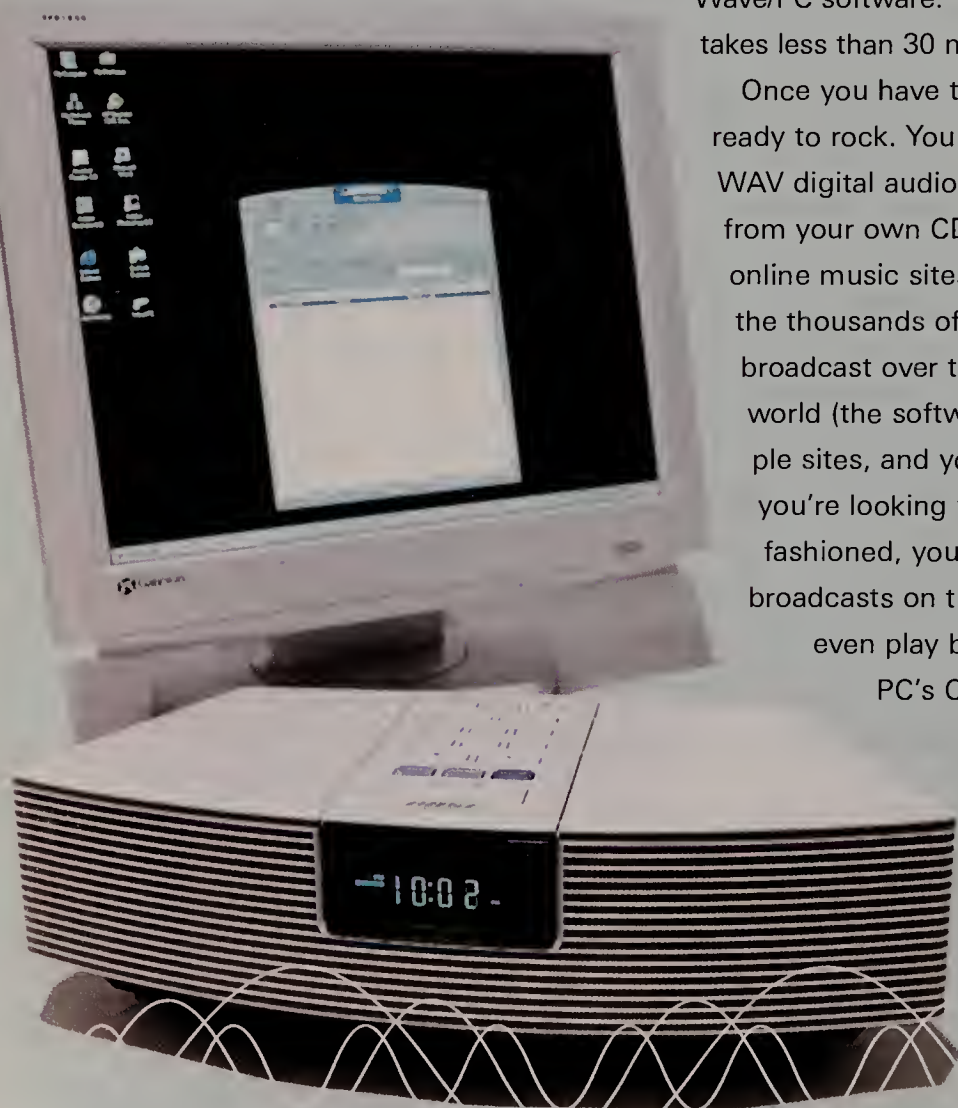
Bose Wave/PC

PRICE \$449

PROS Smooth, rich sound. Cute, useful remote control. Feature-rich software.

CONS Expensive for a PC speaker system.

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Two-Factor Authentication Platform Critical Issue for CXOs

The FiPass Platform Enables Identity
Verification of Anyone, Anywhere, Across
Multiple Web Sites Via a Single Token.

Internet security is not just the CIO's worry. In this era of e-business where millions of transactions occur daily involving billions of dollars of assets, a serious security breach can cause problems that ripple throughout the organization and end up on the CEO's desk. The potential financial impact can cause a CFO and the company's legal counsel nightmares. →



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Security Is Everybody's Concern

Most companies have implemented measures to secure their internal networks from in-house personnel, employees and partners using remote dial-up, and from hackers. However, many e-businesses are still on the learning curve for protecting their Internet "front door" where hundreds of thousands of transactions occur. Access is granted to many of these sites based on a single fixed password. Using a single password for authentication is called one-factor authentication and is highly vulnerable to password theft.

One-factor authentication puts security out of control of the CIO and into the hands of the end-user. Bad password habits by the end-user open the door for identity theft, something a firewall cannot catch. While this may not be the company's fault, it is the company's problem. The consequences of a company's security being compromised by identity theft could jeopardize new e-business ventures and thwart strategic planning efforts.

Crime of the New Millennium

Sean B. Hoar, assistant U.S. Attorney, District of Oregon, calls identity theft "the crime of the new millennium." Realizing the seriousness of identity theft, Hoar issued a USA Bulletin on identity theft and how to avoid it. One-factor authentication—used to access private information such as bank

accounts, brokerage accounts and medical information—is an open invitation for criminals to gain access to a person's most private data and assume their identity for illegal purposes. "It is estimated that identity theft has become the fastest-growing financial crime in America and perhaps the fastest-growing crime of any kind in our society," Hoar comments.



The FiPass Token

The burgeoning wireless technology is opening up even more avenues for password and identity theft as people are now entering passwords in a variety of public venues—restaurants, convention floors, hotels or airports. Although checking bank balances or

e-mail in a hotel lobby, while waiting for a taxi in Manhattan or while standing in the check-in line at the airport may be convenient, concealing your online activity becomes increasingly difficult. These behaviors can lead to identity theft, financial losses to individuals and companies, and potential costly legal action.

Whatever existing network security a company has now, if it is conducting business online with single-factor authentication, it is likely to become another statistic. The Computer Security Institute, with the participation of the San Francisco FBI Computer Intrusion Squad, conducted a survey in 2001 of more than 500 computer security practitioners in the United States. These included corporations, government agencies, financial institutions, medical institutions and universities. Eighty-five percent of respondents had detected computer security breaches in the past year. Losses reported by just 186 of these organizations totaled more than \$377 million.

Until the FiPass two-factor authentication platform, there was no universal Web-based solution that allowed CIOs, catering to hundreds of thousands of Internet users, to feel comfortable that the end-user they were letting in was in fact the user they intended to let in.

"I've been a publisher in the technology business for over two decades and we've reported extensively on the increase of iden-

Secure Computing: Experience and the Right Technology

For more than 15 years, Secure Computing has provided security products consisting of firewalls, Internet filters, and two-factor authentication for corporate intranets and extranets with SafeWord. Secure Computing's entrance into corporate security began with its Sidewinder firewall. The Sidewinder has never been penetrated. In a test using an 11-server extranet, hackers were invited to attempt unauthorized access. The extranet ran for a year, with more than 23,000 sustained attack attempts, but not a single breach occurred. SafeWord protected the database server and e-mail servers in this test.

FiPass's use of SafeWord technology has become even more important as e-commerce has shifted the security focus from keeping intruders out to letting the right people in—a trend that turned the entire security segment of the industry around. "We now want individuals to take orders and pay bills using business systems that companies previously kept hidden from the outside world," says Carr Biggerstaff, senior vice president at Secure Computing.

FiPass Founder and CEO Sean Brennan adds, "We selected Secure

Computing because of their superior software and token technology, which includes unlimited scalability."

In this new market, companies that are still using only a password for authentication are finding that the FiPass solution using the hardware or software tokens provides the answer. "Millions of companies are on the edge of conducting e-business and e-commerce. They are aware of the potential for Internet attacks and are very sensitive to the risk of using fixed passwords. These companies are looking to solutions like FiPass," comments Biggerstaff.

SafeWord Structure

SafeWord is comprised of four major components. Primarily, there is a user directory database where all of the user identities exist. The database has an authentication technology that can process the hardware or software token information for FiPass, as well as smart card information, passwords, fingerprint reader, digital certificates or other end-user authentication means. The database holds custom-defined user roles such as

tity theft leading to fraud," states Joe Levy, CEO and president of CXO Media Inc., whose publications include *CIO* and *Darwin* magazines. "It's absolutely the right time for FiPass to be offering their authentication service, and I strongly suggest that any online business should become a FiPass Secured Site."

One-Factor Authentication Can Lead to the Loss of Revenues and a Lot of Negative Publicity

The one-factor password is the weak link in a security protocol because:

- only one piece of information is needed
- the password is fixed for some time interval
- criminals have numerous methods and software for password detection
- most people are not diligent about changing and securing their passwords
- people use easy-to-discover passwords like family names, birthdays and anniversaries
- people use the same password for multiple accounts

FiPass Founder and CEO Sean Brennan adds, "One-time passcode tokens have a proven history of protecting employees at their given corporations. Today, with the

growth of the Internet, it's imperative to expand this time-tested technology through FiPass, enabling companies to offer the benefits of two-factor authentication to their customers."

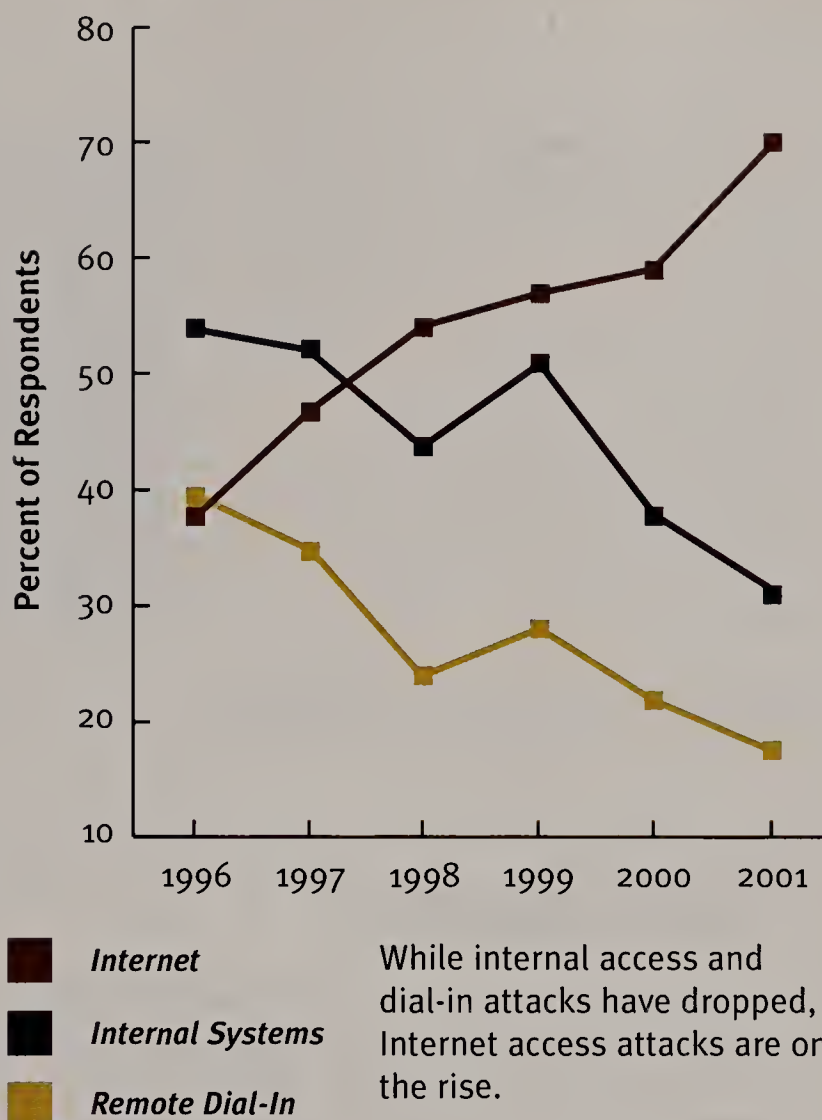
The Customer Needs a Warm, Secure Feeling

Nothing is more important to CEOs than growth opportunities. E-businesses that rely on an increasing customer base need to know that marketing plans to expand that base are not deterred. However, if the customer does not feel secure in making online transactions, this can undermine strategic growth plans. Gartner G2 research showed that for consumers doing Internet transactions, 86 percent are very concerned about security for bank and brokerage account numbers, while 83 percent were troubled by the thought of entering social security and credit card numbers. Approximately 60 percent said that security and privacy concerns stop them from doing business on the Web. Percentages of

this magnitude create a serious roadblock to companies conducting business over the Internet with one-factor authentication.

A poll conducted by Grant Thornton, indicated that more than 90 percent of all U.S. banks plan on taking their business online. In addition, most brokerage houses

Point of Attack



Source: CSI/FBI 2001 Computer Crime and Security Survey

partners, outside salespeople, tech support or whatever roles are needed to define the makeup of the workforce that requires access. The database also holds the privileges associated with these roles. As an authentication management service, FiPass doesn't involve the user role definition or privilege authorization, just the identity verification of the user.

The second component is the system administration console to control and manage the database. SafeWord permits an unlimited number of system consoles to serve distributed organizational centers.

The third component consists of agents that link to the applications. The agent's task is to interrogate the users for their identity, confirm the identity with the SafeWord central server, and check the role and privileges. If the identity is authenticated, the agent allows the user to connect and engage in the permitted transactions.

The final component is the end-user's token authentication device.

Time Is of the Essence

Secure Computing's belief is that network security does not rest on one

particular technology like a firewall. It is based on a layered approach that combines a variety of methods, techniques and products; and FiPass is an essential element.

The market need for two-factor authentication is immediate. Because FiPass does not require drastic system changes, implementation is rapid and effortless. "FiPass is making it easy and affordable. And they are doing it in the e-commerce market, probably the most sophisticated segment in the world," says Biggerstaff.

Biggerstaff adds that, "FiPass comes at a time when the market understands it needs the security, and the customers are ready for it. FiPass offers companies that might have hundreds of thousands of users using fixed passwords, an option that was not available a few years ago—a FiPass token."

"Our partnership with FiPass is very strategic to Secure Computing as it extends the availability of strong authentication from organizations to consumers," says Biggerstaff. "With SafeWord, FiPass provides consumers with the ability to gain secure, authenticated access to a multitude of e-commerce services with a single FiPass token."

are allowing their customers to trade securities via the Internet. Forrester Research predicts that total U.S. assets managed online will reach \$3.1 trillion by 2003. With this much at stake, CXOs (i.e. CIO, CEO, COO, CFO, EVP etc.) must heed the wake-up call.

As long as customers have these insecure feelings, online businesses with single-factor authentication could be missing out on customer growth and loyalty, market share and revenue opportunities.

A Two-Factor Universal Platform

Two-factor authentication has been used



The FiPass System

successfully for more than 15 years to secure intranets, extranets and remote dial-up access for company workers. FiPass now has extended that same proven technology to the Internet by developing a universal authentication platform that provides security and convenience to end-users conducting business online with any FiPass Secured Site.

Two-factor authentication technology is used daily at ATMs where a customer needs both his PIN number as well as the magnetic strip card. Even if someone attains the PIN number, the card is also needed for access. In addition, if the card is lost or stolen it cannot

Security Glossary

Access Control: A set of procedures performed by hardware, software and administrators to monitor access, identify users requesting access, record access attempts, and grant or deny access.

Authenticate: In networking, to establish the validity of a user or an object (for example, communications server).

Authentication: The process of establishing the legitimacy of a user before allowing access to requested information. During the process, the user enters a name or account number (identification) and password (authentication). Additional information is used in some systems consisting of handheld hardware key or token utilized during the user authentication process.

Authentication Token: A portable device used to authenticate a user. Authentication tokens operate by challenge/response, time-based code sequences or other techniques. This may include paper-based lists of one-time passwords.

Authorization: The process of determining what types of activities are permitted. Usually, authorization is in the context of authentication. Once you have authenticated a user, the user may be authorized for different types of access or activity.

Biometric Access Control: Any means of controlling access through human measurements, such as fingerprinting and voiceprinting.

Challenge/Response: A security procedure in which one communicator requests authentication of another communicator, and the latter replies with a pre-established appropriate reply.

Cryptographic Checksum: A one-way function applied to a file to produce a unique fingerprint of the file for later reference. Checksum systems are a primary means of detecting file system tampering on Unix.

Data Encryption Standard: An encryption standard developed by IBM and then tested and adopted by the National Bureau of Standards. Published in 1977, the data encryption standard (DES) has proven itself during nearly 20 years of use in both government and private sectors.

Encryption: The process of scrambling files or programs, changing one character string to another through an algorithm (such as the DES algorithm).

Firewall: A system or combination of systems that enforces a boundary between two or more networks.

Intrusion Detection: Detection of break-ins or break-in attempts either manually or via software expert systems that operate on logs or other information available on the network.

Key: In encryption, a key is a sequence of characters used to encode and decode a file. You can enter a key in two formats: alphanumeric and condensed (hexadecimal). In the network access security market, key often refers to the token, or authentication tool, a device utilized to send and receive challenges and responses during the user authentication process. Keys may be small, handheld hardware devices similar to pocket calculators or credit cards, or they may be loaded onto a PC as copy-protected software.

One-Time Password: In network security, a password issued only once as a result of a challenge-response authentication process. It cannot be stolen or reused for unauthorized access.

Password: A secret code assigned to a user. Also known by the computer system. Knowledge of the password associated with the user ID is considered proof of authorization. (See **One-Time Password**.)

Smart Card: A device the size of a credit card with embedded micro-electronic circuitry to store information about an individual. This is not a key or token, as used in the remote access authentication process.

Social Engineering: An attack based on deceiving users or administrators at the target site. Social engineering attacks are typically carried out by telephoning users or operators and pretending to be an authorized user, to attempt to gain illicit access to systems.

Token: A token is an authentication tool, a device used to send and receive challenges and responses during the user authentication process. Tokens may be small, handheld hardware devices similar to pocket calculators or credit cards. (See **Key**.)

Two-Factor Authentication: Two-factor authentication is based on something a user knows (factor one) plus something the user has (factor two). In order to access a network, the user must have both factors—just as he/she must have an ATM card and personal identification number (PIN) to retrieve money from a bank account. In order to be authenticated during the challenge/response process, users must have this specific (private) information.

Note: Glossary courtesy ANSI

be used without the PIN. The FiPass two-factor solution also requires two pieces of information to validate a person's identity: a password and a hardware or software token that supplies a unique one-time-use alphanumeric code. It is like using a different magnetic strip card every time an ATM transaction is made, which renders the old card useless to a thief.

As more companies become FiPass Secured Sites (FSS), people doing business with their banks, brokerage houses or accessing their medical records need only the one FiPass token to safely access all of their accounts.

One-Factor Authentication Lacking

The vulnerability to criminal elements increases when only a single password is required to access accounts, transactions and personal data. Cybercriminals have developed many ways to hack a password. One method is social engineering, where a person's password is compromised by tricking the individual into revealing the password by posing as someone needing the information, like a field service technician.

Other means of discovering passwords are aided by bad habits of the end-users themselves. Many consumers use easy-to-guess combinations, make infrequent changes, and often write their password down and leave it in conspicuous places, like on their computer monitor. Some con-

sumers not only never change their password, but also assign the same password to all of their online and even ATM bank accounts. This behavior creates a one-stop-shopping environment for criminals. With two-factor authentication, these examples would not create a hazard as the other factor would always be needed.

Software cracking programs can easily discover many passwords by brute force methods employing search algorithms that use dictionaries and acronym lists. Other, more physical means include simply watching a person punch in their password on a cell phone or PDA. More sophisticated methods use electronic "sniffers" on network lines to monitor the characters being sent. With the FiPass token, even if the alphanumeric characters entered are illegally obtained, they will not be valid for the next access.

New technologies are constantly being developed to tighten the authentication process. These include encryption, digital signatures and access management technology. However, many of these technologies

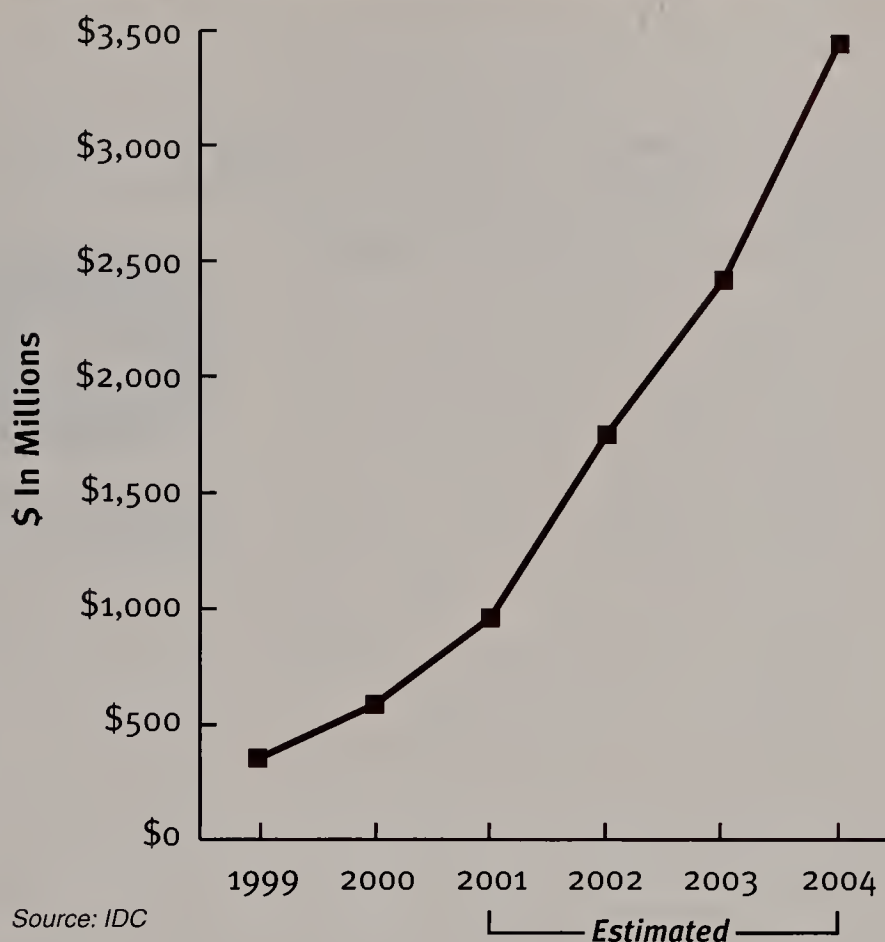
are expensive, require major changes to a company's networking infrastructure and present formidable system interoperability problems.

The reality is that the current widely used method of a single password for access is totally inadequate to serve the growing e-business marketplace.

E-Business Changes the Perspective

Before Internet commerce became prevalent, network security meant keeping the "bad guys" out with firewalls and intrusion detec-

Worldwide Authentication Market



Not Just Hardware Tokens, FiPass Also Provides a Software Token Solution

In addition to the FiPass hardware token, the company also provides a software token. Like the hardware token, the software token generates a six-digit code, but it does so as it resides on a PC, PDA or cell phone.

To obtain a FiPass code on a PC, a user would merely click the FiPass icon, enter their PIN, and then click the button on the graphic of the token. Once the FiPass code appears on screen, the user can then proceed with his login at any FSS. The FiPass authentication process operates exactly the same whether the FiPass code was generated by a software token or a hardware token.

For users who spend most of their time online from the same PC, the software token provides a truly easy means to obtain added security to protect their online identities. For mobile users with a PDA or a cell phone in which they can install the software, the software token is an alternative form factor to the portable hardware token. When new users enroll for FiPass at any FiPass Secured Site, they will have the option to choose the hardware token or software token.



How a User Logs in with FiPass, Using a FiPass Hardware Token:

1. To login to your FiPass Secured Site, your customers access a modified login page and enter their username and password as usual.
2. Then they simply push the button on the front of their FiPass token.
3. This generates a six-character alphanumeric FiPass code.
4. They enter the FiPass code into the appropriate field, and they're in. It's that easy!



tion. As e-commerce focused on bringing customers in, the thinking shifted from keeping the criminal element out to allowing only the right person in. This is when strong authentication practices became essential—making sure that the person requesting admission to a Web site is really who he says he is.

Allowing only the right person into a Web site with one-factor authentication is nearly impossible. Hacking into a company by finding vulnerabilities in network systems has become a sophisticated science. CXOs must be on constant alert and con-

tinually update and reconsider their security measures to keep ahead of Internet hackers. Hacking has grown to such an extent that regular hacker conferences are held.

Strong authentication is critical to a number of e-business sectors that simply cannot put off the implementation of effective authentication technology.

Banks: Most banks offer Internet access, either just to view accounts or to allow transactions such as transfers and bill paying.

Brokerage firms: Companies that allow

customers to buy, sell and trade securities online.

E-commerce: Either B2C or B2B purchasing transactions where credit card numbers are used and/or held in the company's database.

Auction sites and e-exchanges: Companies or individuals put items out to bid and need to deal with validated vendors or bidders; large companies set up supply-chain sites for vendors and private exchange sites for invited bidders only.

Research firms: Companies that sell costly research via the Internet lose money when customers give passwords to others who then can use the research without paying for it.

Medical records: The privacy of medical records is critical. All hospitals, clinics and doctors are vulnerable. The Health Insurance Portability and Accountability Act (HIPAA) requires confidentiality of patient medical information with fines of up to \$250,000 for wrongful disclosure.

For the company engaged in critical financial transactions or highly valued or confidential information, the FiPass solution:

- permits existing security technology to remain intact
- allows the customer to use a single, easy-to-remember password everywhere
- supports multiple Web sites with a single token
- offers opportunities for hosting services handling large numbers of users because it is fully scalable to millions of users
- presents portability options as it can be used wherever the user accesses the Internet, such as via wireless devices
- allows full scalability with no additional system overhead

Guidelines for Good Passwords

While two-factor authentication such as FiPass is one of the best methods of identity verification, choosing a good password is still essential, especially if you don't yet have FiPass.

Here are some rules when choosing passwords to reduce the risk of hacks:

DON'TS:

DON'T choose a password that uses public information about you, such as your social security number, credit card or ATM card number, phone number, birth date, driver's license number and so on.

DON'T choose a password that uses public information about your family or friends.

DON'T choose a password that is composed of any word or words that could be found in a dictionary, in any form or combination.

DON'T reuse old passwords or ones that are similar to your old password.

DON'T use your user ID, or any variation on your user ID, as your password.

DO'S:

DO choose a password that has no easily discerned significance to you.

DO choose a password that is six to eight characters long.

DO memorize your password. Never write it down.

DO use a password that has at least two alphabetic characters (a-z, A-Z) and at least one numeric (0-9) or special (punctuation) character.

DO use both uppercase and lowercase characters. Passwords are case sensitive.

Courtesy Bergen County Technical Schools

Ease of Use

Implementation of the FiPass solution is easy for the end-user. They need only to log on to an FSS and enroll by entering essential information such as name, address, phone number, e-mail address, credit card number and billing information. The end-user then immediately receives an e-mail confirmation number.

Next, FiPass mails the token to the end-user. The end-user now enacts a simple activation procedure by entering the confirmation number, two token codes and the token serial number. This ensures fool-proof authentication of the enrollee. After this,

Continued on page S8

Q&A With Sean Brennan, CEO of FiPass

Is technology the answer to Internet security problems?

Sean Brennan: Yes, as hackers become more sophisticated, the technology that exists to prevent their activities needs to become more sophisticated. It's an ongoing cycle. However, the deployment of improved technology needs to be broadened to go beyond the online business. End-users need to be part of their own security solution and they should know what security technology is available to them so that they can protect themselves online.

How important is customer trust?

SB: Very important. One big obstacle for online commerce is convincing customers that their information is safe. That is why one of the fastest growing businesses in corporate America today is Internet security, and specifically online authentication. Companies can't afford to have an "it always happens to someone else" attitude, because eventually it will happen to them. And if it does, the financial losses could be substantial and customer trust destroyed.

Do the newer security technologies offer promise?

SB: While there are many new technologies offering security solutions, the picture is not clear. There are smart cards, PKI, retinal scans, fingerprint identification and other high-tech authentication technologies. The problem is that the newer technologies are changing faster than standards can be established. And many of the new solutions require costly infrastructure changes. CIOs need to consider how vulnerable they are to various security breaches, and then consider what technology they can use today that is effective, easy for them to implement, easy for their customers to use and a good value.

What's the advantage of the FiPass solution?

SB: Other authentication systems are not only very costly and require major internal changes, but they are not mobile. Retinal scans, for example, are fine, but you need a scanner at each location—that virtually eliminates mobile authentication. With FiPass, all an online business needs to do to become a FiPass Secured Site is add a few webpages and some communication code that allows its servers to talk to our authentication server, and then its customers' tokens can be used in any location, fixed or mobile.

FiPass has been described as layered-on security.

SB: That's because we don't take anything away or change what a company already has for its security protocol. We are just adding another level that makes it that much more secure for their customers.

Why haven't companies picked up on two-factor authentication before?

SB: They have, but they were only using it to secure their internal networks. FiPass authentication technology has been used for the past 15 years securing internal networks for more than 5,000 companies and 7 million people. It's just now that we have brought that same level of security to the Internet.

How does a company benefit from becoming a FiPass Secured Site?

SB: Once you become a FiPass Secured Site, you're part of the FiPass community and you become known as a site that is providing your users with an added layer of security. An online customer who is security-minded, and who originally obtained a token for use at his or her bank site, is likely to consider what online brokerages offer FiPass. Any site that is FiPass Secured is positioned to be more appealing to Internet users concerned about security.

Certainly financial e-commerce companies will be interested.

SB: Absolutely. High net worth individuals that trade securities online—people that have a million dollars or more in their accounts—are already asking for better security. No matter how much an individual has in an account, if they don't feel secure they won't go online to trade or bank. It's that simple.

What are some other important markets?

SB: The online subscription businesses, for example. These are companies that sell expensive research online. They are trying to ensure that the one person that bought the research gets the research—and no one else. The research market is 3.5 million people in the United States, so that's a big market. With the token and two-factor authentication, only one person can get that information. It's a big deterrent to people sharing passwords.

Another market with huge potential is health care, due to the Health Insurance Portability and Accountability Act of 1996 (HIPAA). The law requires safeguards to protect the security and confidentiality of patient information. Tens of millions of patient records require authorized access before information can be transmitted. Authentication provides the first step in that security process, and we provide a universal solution that can be implemented today.

How do you establish momentum going forward?

SB: The good thing is that there are 7 million people in the world who have the tokens now, and they are using them every day to get into their internal systems. That's a lot of accounts. Now they will be able to use the same technology for online accounts rather than solely in a closed corporate system.

Morningstar Investment Services Secures Identities and Access with FiPass

Morningstar Investment Services provides a wide range of financial and investment services for individuals and 60,000 investment advisers that range from financial planners and CPAs to banks. With Morningstar Managed Portfolios, advisers can take advantage of a range of integrated services and delegate portfolio decisions.

Both the advisers and their customers know that for financial transactions, impenetrable security is mandatory. "The clients want to make sure that only the authorized person is gaining access to the accounts," says Tom Florence, president of Morningstar Investment Services.

Morningstar Investment Services knew that at the core of security was a strong authentication system to make customers feel comfortable about placing and accessing their financial information online. To accomplish this, Morningstar Investment Services chose FiPass authentication management. "We were looking for a system that allowed only one person to get in to access their information based on two-factor authentication," says Florence.

Morningstar Investment Services is now secure with FiPass' two-factor authentication, knowing that its clients and its client's customers will be able to conduct business with confidence.

BUYandHOLD Gives Customers Secure Feeling

"You can't pick up a newspaper or turn on the news without hearing about instances of identity theft and other Internet fraud," says Michael O'Dea, executive vice president, COO and CIO of BUYandHOLD, an online brokerage firm.

BUYandHOLD is a brokerage firm targeting long-term investors. A customer can open an account and interact with it like a savings or 401k account. BUYandHOLD allows customers to invest in stocks on a dollar basis. "If you want to put \$50 into IBM, \$50 into Cisco, you can do it," explains O'Dea. BUYandHOLD's strategy allows the investor to dollar-cost-average over time.

The reports of fraud capture O'Dea's attention because BUYandHOLD customers have invested their money in securities managed by BUYandHOLD's unique online services, which cater to those interested in long-term investment opportunities. BUYandHOLD's customers access its Web site frequently, and many have significant amounts of money invested. Any nervousness their customers might have must be addressed.

To assuage any security fears its customers might have, BUYandHOLD decided to offer FiPass' two-factor authentication as an option for those customers who felt they needed an added level of security. "I know people who won't use their credit cards at restaurants because they don't want them out of their sight. We have to respect that attitude," adds O'Dea.

O'Dea explains that BUYandHOLD, as a financial institution, must always ensure that its customer information is protected. However, O'Dea recognizes that there are different levels of security that people feel they need, depending on their habits. O'Dea explains that a BUYandHOLD customer might want to guard against an instance where they walk away from the computer with their password taped to it, and desire the added protection.

The FiPass solution fit the bill to put BUYandHOLD customers at ease. "FiPass provides the kind of security we were looking for, and we don't have to put in a lot of heavy infrastructure to support it," adds O'Dea.

Continued from page S6

when entering any FSS, the end-user needs only to enter a user ID, password and the unique, one-time FiPass code from the token.

With such remarkable ease-of-use, users are empowered to protect their identity. With token in hand, this newfound sense of control may translate to a greater sense of comfort and confidence about conducting online transactions.

Ease of Implementation

The FiPass solution places minimal implementation tasks on the e-commerce site and virtually no overhead once activated. As soon as the FiPass software is installed on the company server and the unobtrusive FiPass footprint is implemented, the site is added to FiPass's authentication service and becomes an FSS. When an end-user enrolls, FiPass handles shipping of the FiPass token and billing. No other software or network changes are needed.

The ease of implementation is made possible because FiPass provides:

- API for login modification
- HTML enrollment and activation forms as well as disclaimers
- client-side forms and validation code (JavaScript)
- onsite technician/consultant to support installation
- assigned representative to each FSS

FiPass will work with all popular Web servers, including Apache, IBM Web Sphere, IIS 4.0 (Windows NT4), IIS 5.0 (Windows 2000), and Netscape Enterprise Server.

Both Company and Customer Benefit

The nature of the new e-business paradigm is to grow the base of customers allowed to come in to a Web site. At the same time, sta-

tistics show that security incidents over the Internet are increasing dramatically. A single fixed password, even with conscientious password management, is inadequate given these conditions. If a company does not deploy two-factor authentication to help protect itself and its customers, it is missing out on a proven solution that has been the stalwart for internal network security for years. The customer is also missing an opportunity to use a simple procedure that can deter identity theft.

With FiPass, CXOs can guard against security violations by securing the front door, traditionally the weakest link in any company's security protocol. For e-businesses, this is a mandatory step. Forward-looking companies can accomplish this goal with the FiPass security platform. It is proven, secure, highly scalable, easily implemented and immediately available.

FiPass' Brennan notes, "The growing trend in the online world involves issues of security and identity verification. We are thrilled that FiPass could lead the way in the evolution of authentication through the development of our Web-based platform."

For more information, log on to www.fipass.com and see our demonstration, or call 978.465.8100.

U.S. Clearing Serious About Security

U.S. Clearing, a FiPass Secured company, handles the trade clearance and back-end administration for dozens of brokerage firms, mutual funds and banks. Mike Lyons, chief administrative officer for U.S. Clearing wants his company to be positioned as offering a strong additional layer of security to its client institutions so that those companies can offer FiPass to their customers. Lyons explains, "The timing is right for anyone handling transactions to be focused on security and specifically on authentication. Being FiPass Secured is smart because it communicates to our client companies that we are extremely diligent about verifying the identities of anyone making a transaction to be processed by U.S. Clearing."





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The Unbearable Shortness of Film

WEB CINEMA The plight of the short film has been a constant (losing) battle for attention with its big brother, the feature. Fans of shorts are lucky if they live near an art house that runs an occasional festival. At the Academy Awards show, the short film award winners are usually ushered off by the orchestra a few words into their speech.

But a handful of Internet sites are giving the short a

new life—or at least a screen to play on. Web surfers with either Real Player or Windows Media Player can watch the films—which range in length from two to 45 minutes—on their PCs (a high-speed Internet connection is a big help here). The sites are free if you register, and you can even submit your own film, though there's no guarantee your **Conversations with Aunt Hilda** will make the cut.

—Ben Worthen

iFilm www.ifilm.com

In addition to short subject films, iFilm is a film information and gossip portal—which is fortunate because its film offerings could benefit from some serious quality control. However, many viewers don't share my opinion: One of the site's top-rated films, **405** by Bruce Branit and Jeremy Hunt, has been watched more than 2 million times. Still, most of the movies are lowbrow humor—

like Jeff Sweeney's **Beyond Insanity** in which three mental patients describe their (really stupid) conditions—or borderline pornographic.

There are some diamonds in the rough, however. **The Absent-Minded Waiter**, starring Steve Martin in his pre-**The Jerk** days stands the test of time as do Walter Williams's **Mr. Bill** films, starring the old **Saturday Night Live** mainstay.

Bijou Café www.bijoucafe.com

To the relief of the indecisive film viewer, Bijou Café doesn't have quite the selection of the other film sites. So rather than break films into genre, it divides its 100 or so films into feature, short subject and serial categories. The site design strives for that retro look that lets antique stores charge \$7.50 for a plastic shot glass. What's nice is that it manages to back up the look with a number of films from the '30s, '40s and '50s. If the camp horror of Ed Wood's 1956 **Bride of the Monster** doesn't give you chills, then

Hitchcock's 1935 classic **The 39 Steps** will. Other highlights include the pilot for the Groucho Marx show **You Bet Your Life** and Beatles documentary footage. Bijou Café also has some new films buried in the short subject category and a newsletter that highlights what's happening in the Internet film world. One downside: Unlike the other sites, Bijou makes you pay, either by the film (approximately 50 cents each) or a \$3.99 monthly membership (which drops to \$2.99 after four months).

Atomfilms www.atomfilms.com

Atomfilms has a giant selection. But unless you're thrown into a state of existential angst by the philosophical implications of Ben Franklin dropping the F-bomb while scantily clad women grope each other, Steven Grasse's **Bikini Bandits and the Time Machine**—the site's most popular film—won't offer much more than temporary titillation. (If you're really looking for a cheap thrill, rent Russ Meyer's feature-length

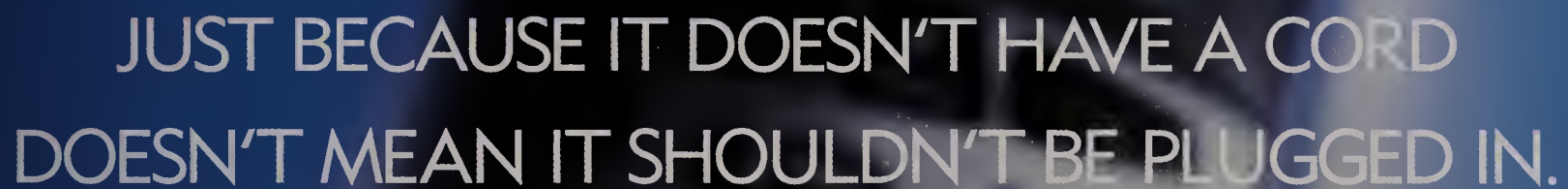
sexploitation flick **Beneath the Valley of the Ultra-Vixens**.)

Besides the obvious genre classifications, you can sort through Women Auteurs and Star-Powered categories. Doing a name search for your favorite movie star, however, is a crapshoot. Once in a genre's film list, you can sort by name or by viewer rating (the site uses a 0-5 star system). Mark Yoshikawa's **Reflexus**, a highly rated thriller about a man who witnesses his

own crime, is another film that will please the most discriminating viewer. Visitors in need of a laugh can preview Oscar winner **Creature Comforts**, a brilliant mock-documentary of zoo life by Nick Park of **Wallace and Gromit** fame.

One neat feature: Atomfilms lets cinephiles download movies on to PalmPilots and Pocket PCs.





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Help for the Harried Traveler

URBAN RENEWAL Business travel is typically tiresome, but the headaches only increase when you have to navigate New York City, London or one of the world's other metropolises. Whether you're visiting a city for the first time or already know its alleys inside out, you can benefit from *The Economist's* new online Cities Guide (www.economist.com/cities).

This free series on 12 of the top cities for business travelers—New York, San Francisco, Washington, D.C., London, Paris, Berlin, Brussels, Moscow, Tokyo, Hong Kong, Singapore and Johannesburg—gives business travelers how-to info in an accessible format. The guides feature regularly updated facts and tips, written by *The Economist's* correspondents in the magazine's usual droll style, on just about everything business travelers need to know, even if they didn't know they needed it. Topics include how to get around (public transport in Moscow is not recommended unless you thrive on "discomfort, uncertainty and delay"), how much things cost (in Singapore, a whopping \$1,200 for a two-day business trip—excluding flights!) and how to kill a spare hour (settle into a chair at the Art of Shaving Gentlemen Barber Spa in New York). Three-page "cheat sheets" for each city can be printed or e-mailed.

About the only thing missing from the Cities Guide is the capability to download to a PDA. How nice it would be to have the keys to a city in the Palm of one's hand.

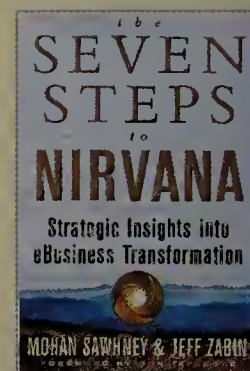
—Edward Prewitt

reviews

Self-Improvement

The Seven Steps to Nirvana: Strategic Insights into eBusiness Transformation

By Mohan Sawhney & Jeff Zabin | McGraw-Hill, 2001



WHY MUST BUSINESS BOOKS READ LIKE SELF-HELP BOOKS? IN THE CASE of *The Seven Steps to Nirvana*, it's because the authors believe that the self-help genre is the best way to communicate and stimulate change in companies "in need of improvement."

The book is designed for senior executives in companies that have not already been significantly changed by e-business. The authors focus on the big picture, showing what e-business can do and how important it is to integrate both new ideas and new processes into organizations. Even though the book reduces e-business transformation to only seven steps (vision, strategy and infrastructure, to name a few), the authors touch on complicated issues.

The constant references to old sayings and metaphors can be a trifle annoying. But executives who are not entirely technology illiterate—acronyms like CRM, SCM and ERP are liberally thrown around—and are looking for a little e-business inspiration should find this book helpful.

—Danielle Dunne

Changing Channels

The Hybrid Company: Reach All Your Customers Through Multi-Channels Anytime, Anywhere

By Bernadette Tiernan | Dearborn Financial Publishing, 2001



THE BEST WAY TO STAY IN BUSINESS IS WITH A MULTI-channel approach, according to Bernadette Tiernan, author of *The Hybrid Company*. Her book is based on an idea that few people are likely to disagree with—the more ways you reach customers the better.

She defines a hybrid company as one that has a presence in at least two channels that strengthen each other. The three channels she focuses on are bricks (a physical presence), clicks (an online presence) and print (a catalog-type presence).

The book covers different strategies for expanding into new channels. Gateway is cited as an example of a company that successfully branched out. It moved beyond selling computers over the telephone to opening both stores and an online channel in 1996.

In addition to channel expansion, however, Tiernan emphasizes that becoming a hybrid company means reaching out to customers across all your channels. For example, Home Depot, which offers in-store classes, brought the same instructional approach to the Web. It offers e-mail help and online tutorials, and even tries to attract visitors through online chat topics that have nothing to do with home improvement, such as sports.

—D.D.



THE TENTH ANNUAL

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FEATURED SPEAKERS

F. WARREN MCFARLAN

Senior Associate Dean
Harvard Business School

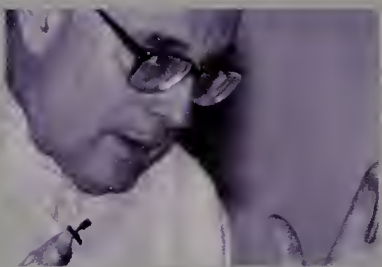
JARON LANIER

Lead Scientist
National Tele-immersion Initiative
and Chief Scientist, Eyematic Interfaces

**AND... MEET TODAY'S VALUE PIONEERS—THE WINNERS
OF THE 10TH ANNUAL ENTERPRISE VALUE AWARDS**

CIO MAGAZINE'S
ENTERPRISE VALUE RETREAT & AWARDS CEREMONY

Agenda



JOIN US AT THE TENTH ANNUAL *CIO Enterprise Value Retreat* for a two and a half day, intensive case study program, led by Harvard Business School's F. WARREN MCFARLAN, where we will examine how CIOs can more rapidly and reliably deliver performance to the overall organization. The stakes have never been higher!

SUNDAY, JANUARY 27

8:00 AM – 1:30 PM

Partners Golf Tournament

Enjoy a round of golf on the Ventana Canyon Course

3:00 PM – 6:00 PM

Registration

8:00 PM – 9:30 PM

Partners Café Reception

Meet and network with other participants, Award Winners and Retreat Partners in our informal networking lounge.

MONDAY, JANUARY 28

7:30 AM – 8:30 AM

Registration and Breakfast

8:30 AM – 9:00 AM

Opening Remarks and Retreat Welcome

ABBIE LUNDBERG
Editor in Chief, CIO Magazine
What is Value? Lundberg explains how the decisions and

deliberations of the Enterprise Value Awards judges reflect a shift in the IT value proposition — and what it means for businesses today.

9:00 AM – 10:30 AM

Retreat Introduction and Welcome Address: The Internet-Transformed Organization

F. WARREN MCFARLAN,
Senior Associate Dean, Director of External Relations, Albert H. Gordon Professor of Business Administration, Harvard Business School
In the aftermath of the attacks, Y2K and the dotcom debacle, both CIOs and general managers might be forgiven for thinking that things would be moving at a less hectic pace in the IT world. In fact, exactly the opposite is true as the Internet, intranets and extranets are deeply impacting the operations and competi-

tive positioning of most major corporations. The critical question has become whether to be a fast adopter or a cautious follower. Different firms have followed both strategies, with great success. This work is taking place on a global scale with the impact the same in Dallas as in Hong Kong. The core of this Retreat will be built around one of the largest (and explosively growing) credit card providers in the U.S.

10:30 AM – 10:45 AM

Enterprise Value Award Winner Presentation

10:55 AM – 11:25 AM

Mid-Morning Break

11:35 AM – 12:35 PM

Will Computers Become People in 30 Years?

JARON LANIER, *Lead Scientist, National Tele-immersion*

Initiative; *Chief Scientist, Eyematic Interfaces*

We are used to hearing claims that when computers become a million times more powerful in about 30 years, they will become equivalent to humans or greater than humans. In order to examine whether this might be true, we must rethink a range of questions such as: "Why did evolution take so long?" and "Why is contemporary software so unreliable?"

12:35 PM – 12:50 PM

Enterprise Value Award Winner Presentation

12:50 PM – 2:00 PM

Luncheon

2:00 PM – 2:45 PM

Industry Briefings

2:50 PM – 3:35 PM

Industry Briefings

To enroll or for more information, call 800 355-0246, fax the form to 508 879-7720, or visit our website at www.cio.com/conferences

3:45 PM – 4:15 PM

Coffee Break

4:25 PM – 5:10 PM

Special Presentation on Security and Privacy

CIO, in conjunction with the U.S. Department of Commerce's Critical Infrastructure Assurance Office, hosts a special presentation on security and privacy issues.

5:10 PM – 5:40 PM

Global Industry Value-Chain Restructuring

F. WARREN MCFARLAN

Every aspect of the industry value chain is potentially transformed by IT. Inbound logistics, outbound logistics, sales and infrastructure all operate in an entirely different way in this new world.

Organizations are rethinking their core competencies to decide what they wish to keep inside the boundaries of the company, and what they choose to delegate to

others for execution. This realigning of what lies inside/outside the corporation is one of the deep, IT-enabled transformations of the early 21st century.

5:45 PM – 6:45 PM

Partners Café Reception

Catch up with other participants in our informal lounge, share ideas and experiences.

7:00 PM – Midnight

Partner Hospitalitys

TUESDAY, JANUARY 29

7:30 AM – 8:30 AM

Breakfast

8:30 AM – 8:45 AM

Corporate IT Spending Trends — Where are They Headed?

GARY BEACH

Group Publisher, CXO Media Inc.

Every month for the past year

and a half *CIO* Magazine, in

partnership with Ed Yardeni, chief investment strategist of Deutsche Banc Alex.Brown, has surveyed a panel of senior executives on current and future IT spending and other issues. Beach presents an overview of the latest results and emerging trends from the *CIO* Tech Poll.

8:45 AM – 9:00 AM

Enterprise Value Award Winner Presentation

9:00 AM – 10:00 AM

E-Commerce Management

F. WARREN MCFARLAN

Even as the world of B2B exchanges has fallen apart, the challenges and economic opportunities implicit in implementing B2B links and B2C links are moving forward rapidly (the bottom line contribution can be enormous). Two very different industries are looked at; one is the world of B2B evolution in the telecommunications industry and the extraordinary new standards of support that have been established; the other captures the major repositioning of various players in the financial services industry. This battle consumes the attention of everyone from the CEO to the CIO in trying to get it right.

10:00 AM – 10:15 AM

Enterprise Value Award Winner Presentation

10:25 AM – 10:55 AM

Mid-Morning Break

11:00 AM – 11:45 AM

Industry Briefings

11:55 AM – 12:10 PM

Enterprise Value Award Winner Presentation

12:10 PM – 12:55 PM

Globalization

F. WARREN MCFARLAN

Almost unimaginably, technologies have spread out across the globe and provided fundamentally new ways of distributing work and linking organizations together. The special challenges posed by certain environments, such as China and India, are dealt with. It is a vastly shrunken global arena that we are dealing with today.

1:00 PM – 3:45 PM

Luncheon and Case Study Workgroups

3:45 PM – 5:45 PM

Informal Networking and Recreation

5:45 PM – 6:45 PM

Enterprise Value Awards Reception

7:00 PM – 9:30 PM

Enterprise Value Awards Dinner and Ceremony

Come raise a glass and toast the winners at our black tie dinner and ceremony, proudly underwritten by Genuity.

9:30 PM – 11:30 PM

Dessert Reception Hosted by Genuity

Cap off the evening with a special post-awards reception.

WEDNESDAY, JANUARY 30

7:30 AM – 8:30 AM

Breakfast

8:30 AM – 10:30 AM

Case Study Workgroup Presentations and Discussion

10:30 AM – 10:45 AM

Mid-Morning Break

10:45 AM – 11:30 AM

Reflection

F. WARREN MCFARLAN

The Retreat closes with a discussion of the specific management practices currently in use by leading adapters to the new information age.

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JANUARY 27-30, 2002

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☐ **Government/Military \$3,730**

This fee includes your hotel for three nights. CIO will make your hotel reservations for arrival Sunday, January 27, and departure Wednesday, January 30. Additional hotel night reservations are your responsibility.

☐ **Companion Program \$375**

This fee includes all scheduled meals, receptions and entertainment, companion breakfast and planned companion activities at the Enterprise Value Retreat. Companions are not eligible to participate in the golf tournament or Retreat sessions. Companions must be enrolled in this program to attend any Retreat function.

☐ **Sales/Marketing/Consulting \$10,000**

This fee applies if you hold a sales, marketing, business development or consulting position, including executive management of IT vendor and consulting companies. This enrollment fee is payable by company check only and does not include three nights hotel. CIO will make the final determination of this category.

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All fees must be paid prior to the Retreat, and all cancellations and changes must be made in writing. You may cancel your Retreat attendance up to December 21, 2001, without penalty. A \$900 administration fee will be imposed for cancellations received between December 22, 2001 and January 11, 2002. No refund or credit will be given for cancellations received on or after January 12, 2002, or for no-shows. CIO reserves the right to limit attendance to practitioners and Partner organizations.

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or visit our website at www.cio.com/conferences

All Aboard

How the former head of the Federal Rail Administration helped her agency switch tracks from legal pads to laptops



Jolene Molitoris, the first woman to lead the Federal Rail Administration, now serves as president and CEO of GeoFocus, a transportation technology company in Boca Raton, Fla.

I'VE BEEN IN THE RAIL TRANSPORTATION BUSINESS for 20 years and have learned many lessons along the way. Success is defined by the customer, and customers include not only those shipping and receiving goods, but also the communities across the country through which the trains run.

When I became Federal Railroad administrator in 1993, part of our agenda was set through then Vice President Al Gore's National Performance Review: We wanted to make sure that government was in the customer service business. We had learned from our review of the Federal Rail Administration (FRA) that our customers thought we were too slow, not responsive enough and way too hard to deal with. We needed to change that.

From the start, we knew that technology would be a critical tool for helping us operate better and at lower costs. But in many ways, we had to create a technology environment from scratch. For example, in 1993 Federal Rail Administration inspectors were still using yellow legal pads and pencils when they worked at accident

sites and reported on their work at the end of the day.

The only way to change that situation was to focus on it and to commit resources—both budgetary and human—to the technology challenge. Consequently, when government budgets were being set, I went to the table and fought for the small investments that were crucial for us to continue to upgrade our technology. We also knew that success and excitement would be contagious, so we encouraged and supported FRA employees who saw technology as an opportunity and were champing at the bit to use it. Out in the field, some people from railroads found technology intimidating. So we created full-time technology managers in the field to provide training and help everyone get comfortable and take full advantage of our new computer technology. It was a team effort. And it worked.

Today, FRA inspectors have laptops, digital cameras and access to a sophisticated private network so that communications can be in real-time and data can be analyzed almost instantaneously. As a result, FRA colleagues, the rail workers and managers have all been empowered. And the U.S. rail system is now safer than at any other time in history. It couldn't have happened without technology.

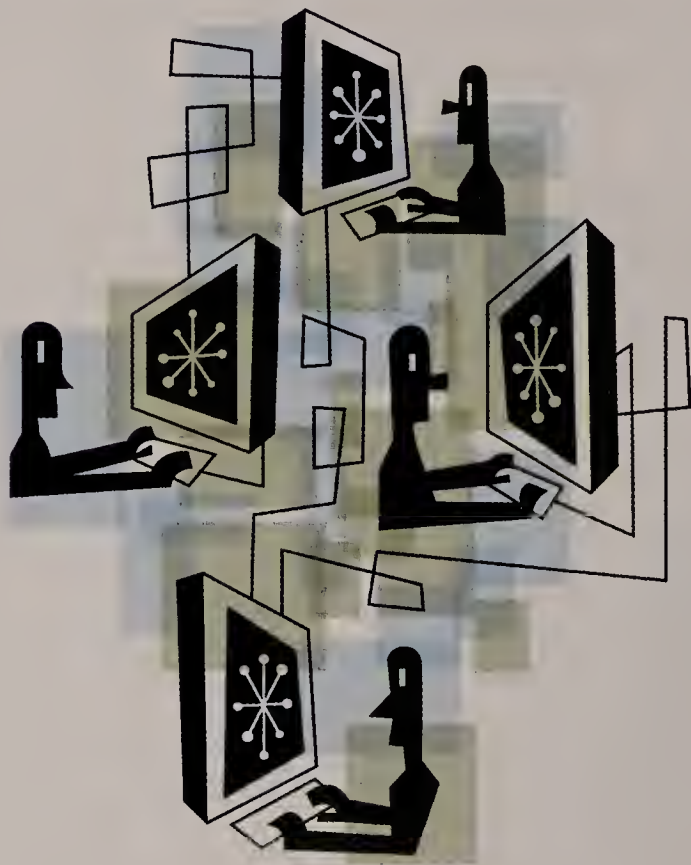
We successfully adopted technology because we were on the ground listening to our customers and everyone in the field, and now technology keeps FRA managers closer to their teammates and their customers.

My advice to other executives involved in technology is to stay close to people at the front lines who know what they need to be more effective and more efficient. Building the new FRA meant transforming the job of FRA administrator into a very hands-on position. I was out in the field in steel-toed boots. I was at accident sites. I was a conductor. I kept learning, listening and experimenting. The 21st century CEO needs to be involved in the day-to-day reality to make good decisions. If you're too far away from the customer, you can't be successful. ■

Send your war stories to headfirst@darwinmag.com.

PHOTO BY FURNALD/GRAY

What Is P2P Computing?



IN TYPICAL CLIENT/SERVER COMPUTING, SERVERS control the flow of data and information into and out of client computers. Essentially, the server runs the show. With peer-to-peer (P2P) computing, the server is removed from the equation, allowing computers—and more specifically, their users—to share files and other data directly, without going through a central server.

How does peer-to-peer computing work?

The P2P model creates the effect of communal living. Imagine a group of thirtysomethings with common ideas about living together and sharing certain belongings. They have one cabinet where they put everything they're willing to share—clothes, CDs, food—but they can also have a locked cabinet where they store private belongings—diaries, savings bonds, photos. P2P works the same way. By downloading various types of software onto a hard drive, you can connect to a network of other users who have downloaded the same software. You specify which information on your hard drive you want to make public, and you can access what others have made public. So if you're looking for a photo of some special Olympic moment, and it's available on any of the hard drives of the connected computers, it's all yours.

Wait. Are you talking about Napster?

Not necessarily. For some, P2P has become synonymous with Napster, the site that let music fans download software to locate and share music files from the hard drives of other members. (The problem, of course, with sharing free music files is that the people who create the music aren't being compensated. That's why the recording industry took Napster to court.) According to purists, Napster doesn't fit in the P2P category because it keeps a central database of users. Ultimately, the attention that the site has garnered may have hurt the P2P community.

What will P2P mean to my business?

Most likely, you now send files to other people using clunky e-mail attachments that are dependent on a central server and can be intercepted. P2P allows people to share files independently, without going through servers. E-commerce could benefit as well—think of a Napsterlike service that charges members. And if members of B2B exchanges could use P2P to cut out the middlemen that serve them, such exchanges could become a whole lot more profitable for buyers and sellers.

What are we waiting for? Let's go.

Not so fast. Dozens of startups are offering P2P software, but the market is still brand-new, and shake-ups are inevitable. P2P has yet to make friends with most IT departments, because when users' workstations start doing the work of servers, technology people—accustomed to being responsible for what information people have and how they pass it along—start worrying about bandwidth and security. Take away that control, and you invite upheaval. So while it may have a long way to go, P2P's potential is hard to argue. After all, you may recall the last such idea created under the rubric "sharing and connecting." It was called the World Wide Web. 

Is there a technology out there that you just don't get? Let us know at learning@darwinmag.com.

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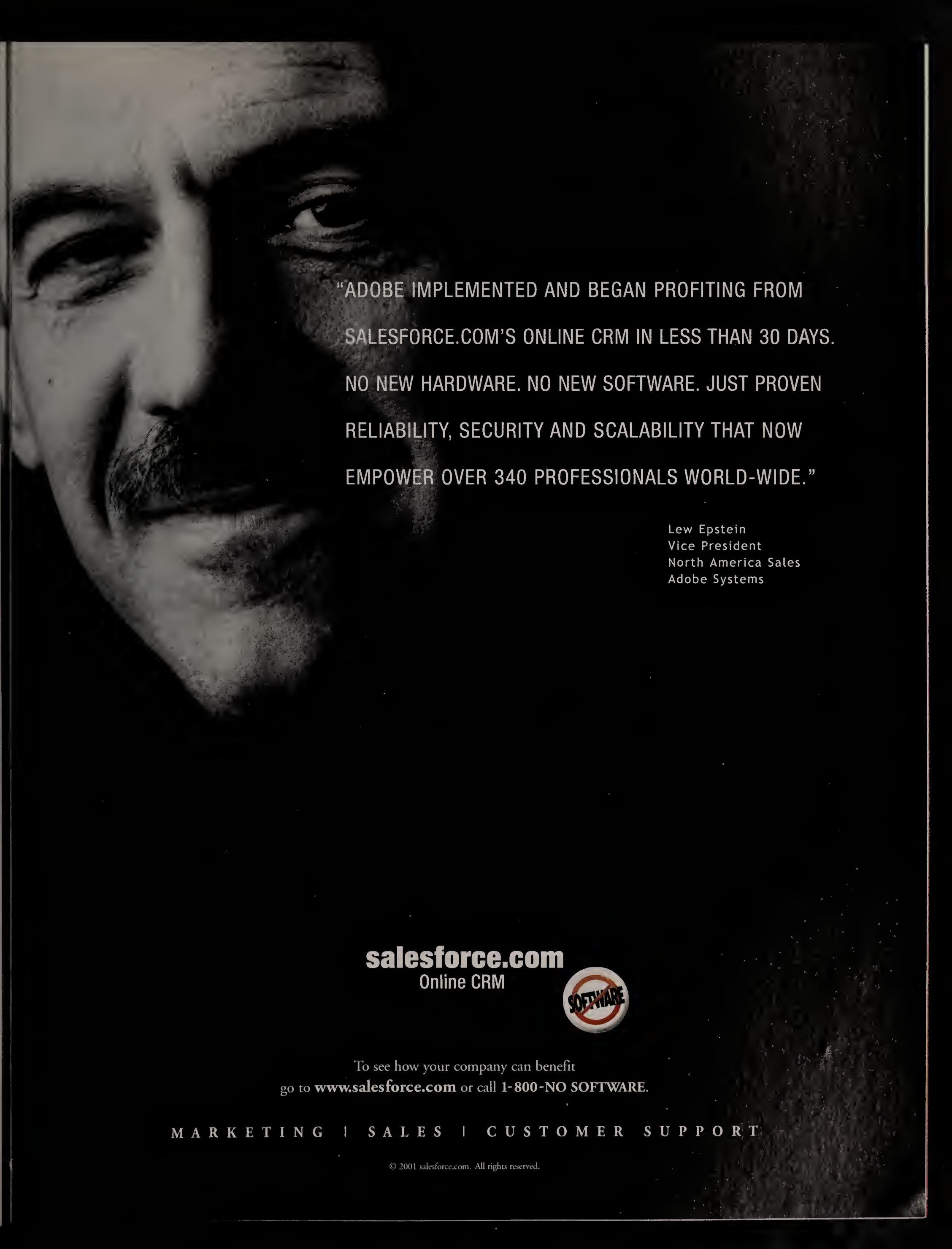
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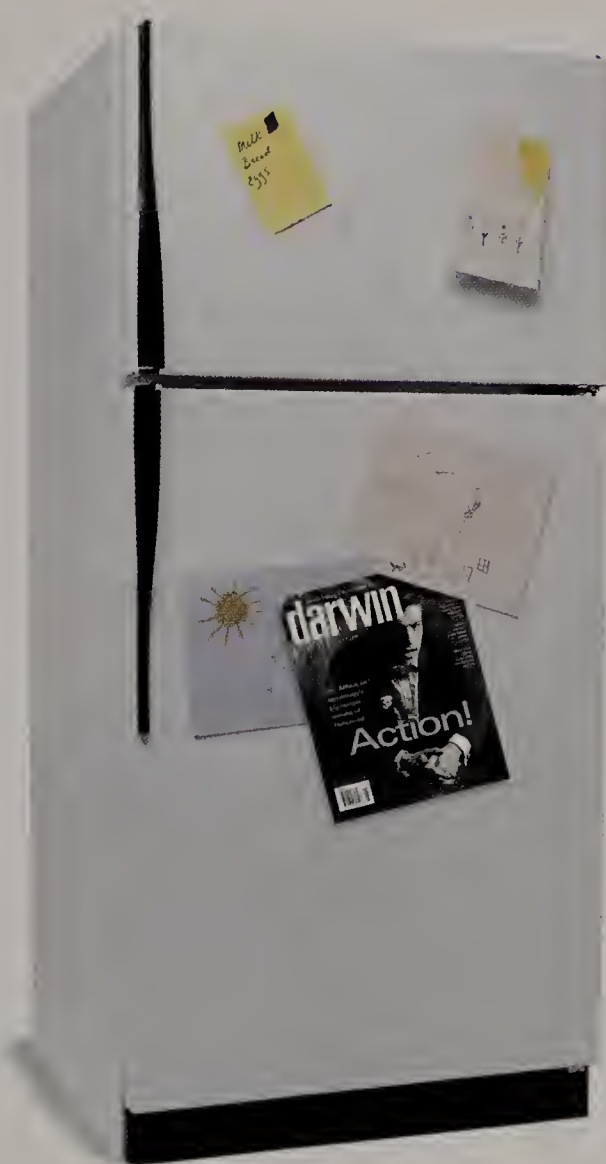
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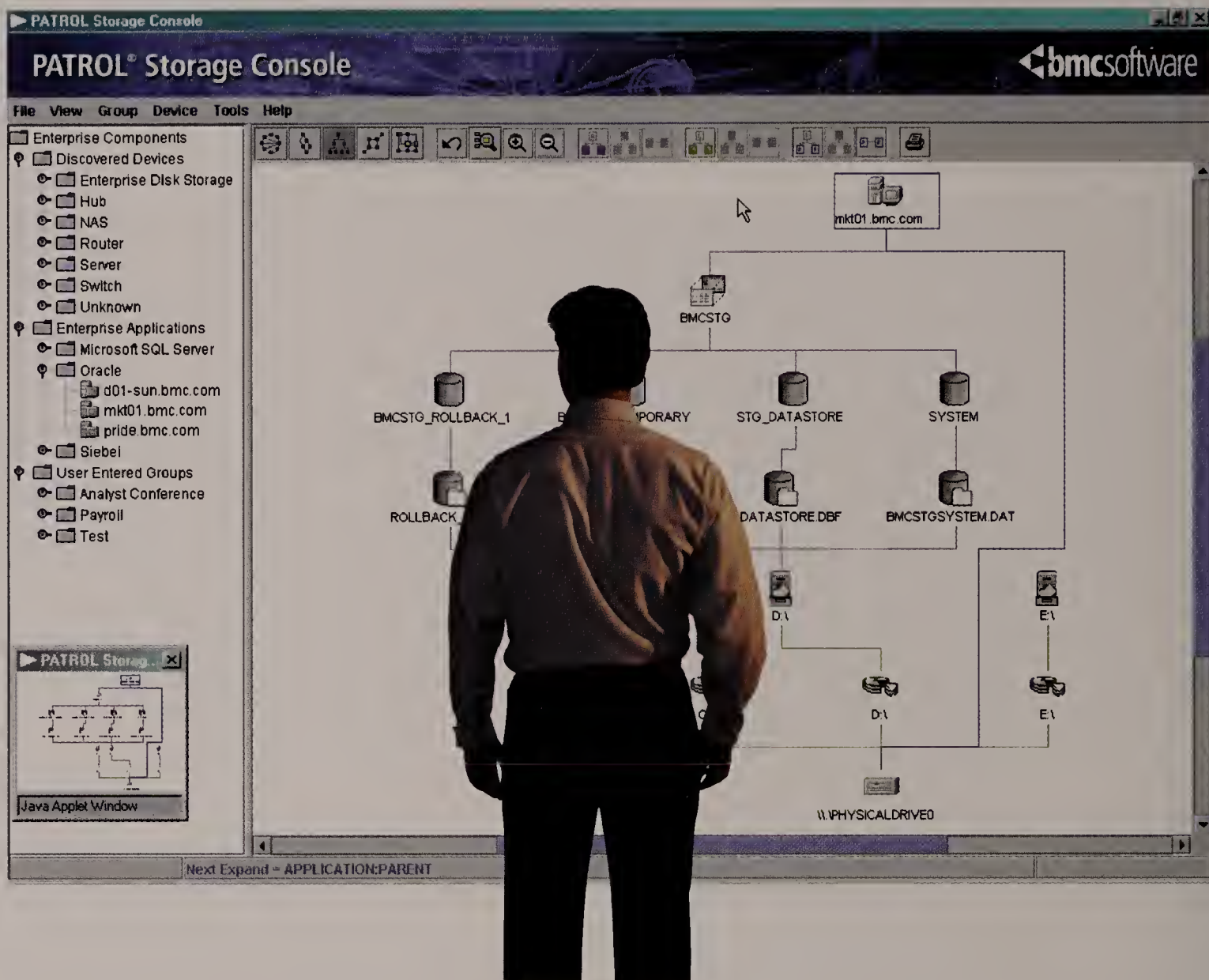
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